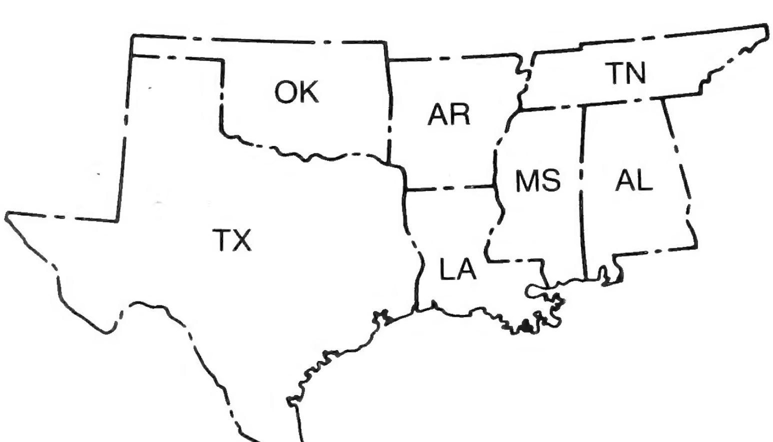
States
Department of
Agriculture

Forest Service

Forest Resource
Report No. 24

The South's Fourth Forest: Alternatives for the Future

The South, States and Regions



South Central Region

Southeast Region

United States Department of Agriculture

Forest Service

Forest Resource Report No. 24

June 1988
Washington, DC

The South's Fourth Forest: Alternatives for the Future

Foreword

The original forest, the one that stretched without end across the South when settlement began, was harvested by the early 1900's. The "second forest," the one that supplied the wood from the 1930's through the 1960's for the rapidly growing pulp and paper industry and for the other wood-using industries, has almost entirely been cut. Now the "third forest" is being harvested. Timber from this forest is the most important agricultural crop in the South. The forest industries using this timber lead all other manufacturing industries in numbers of employees and in wages and salaries paid to workers.

The third forest will continue to be the source of the timber harvested in the South during the rest of this century. The forest that will come after that—the South's "fourth forest" —can take almost any form desired.

The changes now taking place in the third forest are cause for great concern. Our most recent surveys of forest resources show that net annual timber growth, after rising for decades, has begun to decline. Softwood timber removals are above net annual growth over large areas, and inventories are beginning to decrease. A similar situation is developing for hardwoods. If these recent trends continue, the forest resource and the economic importance of the forest industries in the South will surely decline.

But this need not happen. The development of the fourth forest can be managed. There are opportunities to double current softwood growth and sustain employment and income in the forestry sector.

Achieving this goal will require increased investment in programs of forest management, protection, technical assistance, research, and education—the same kind of programs that led to the great improvements of the past. Many opportunities for increased investment result in benefits greater than the costs. And if we make the investments, the South will continue to have an abundant supply of timber, to the great benefit of the economy and society.

F. Dale Robertson

F. DALE ROBERTSON
Chief

Preface

The preface to "The South's Third Forest . . . How It Can Meet Future Demands" (Southern Forest Resource Analysis Committee 1969) began:

> The . . . analysis was developed to learn how the South achieved its vastly improved, if not wholly favorable, timber position over the past several decades and how this trend could be continued.

In a general sense, this is also the basic purpose of the present study.

Concern about the timber situation in the South began in the early 1900's, when it become evident that forests over much of the South were not regenerating after harvest. This concern led to a series of national and regional analyses that provided an analytical basis for developing policies and programs to renew and sustain the South's timber resource.

As described in the second part of this study, these policies and programs—fire protection, technical and financial assistance, research, education, and the establishment of managed industry, public, and other private forests—have been effective. They resulted in the regeneration of the second forest in the South and made possible the establishment and growth of the pulp and paper and softwood plywood industries. They have also shaped the third forest—the forest that will be the source of most of the timber harvested in the South in the rest of this century.

The kind of forest that will exist after that—the fourth forest—still remains to be determined. Development of the fourth forest can be managed, and the forest itself can take almost any form desired. And that is the central focus of this study: what kind of forest is evolving, what kind of forest will be of greatest benefit to the economy and society in the South, and how can it be achieved?

The study has five major parts dealing with these questions. The first is concerned with the economic importance of the forests in the South. It describes the uses of the forest; the area, location, and characteristics of the timberland; the volume and value of roundwood products; and the contribution of timber-based manufacturing in terms of employment, wages and salaries, and value of shipments. This material documents the great importance of the forest resource and the timber-based industries to the economy and society in all Southern States.

The second part of the study describes past changes in the forest resource and forest industries. It relates these changes to shifts in the use of land for crops and pasture; research and technological developments; and programs from the Federal, State, forest industry, and other private sectors on management, assistance, and education. This part of the study explains how the timber situation has turned around in the South, from the lack of regeneration of the resource in the late 1800's and early 1900's to successful regeneration and the great increases in timber growth that have occurred in the last few decades.

The material in this chapter also provides a means of appraising the effects of the policies and programs that have been in place and a perspective for guiding policies and programs in the future.

The third part of the study is concerned with projections of changes in the timber resource—timber supplies (harvests), net annual growth, timber removals, and timber inventories. These projections—the base projections—show what would happen to the timber resource given present expectations about basic changes in demand determinants such as population, economic activity, income, and product prices; and changes in supply determinants such as the area of timberland, management intensity, growth responses, and stumpage prices. The effects of a series of other futures or other expectations (about changes in various demand determinants such as economic activity and supply determinants such as area change and management intensities) are also simulated.

These projections provide a means of identifying future or developing timber problems. They provide guidance for many decisions on long-range commitments such as investments in plant and facilities and timber management practices whose effects are realized over an extended period of time. Finally, they also provide the data needed for analyzing the economic, social, and environmental implications of the various futures that have been simulated.

The fourth part of the study is concerned with these implications. It describes the impacts of the futures analyzed on the resource, stumpage and product prices, lumber and plywood production, roundwood pulpwood consumption, employment and wages and salaries in the timber-processing industries, needed investments for timber management and plant and equipment, State and local government revenues, and wildlife, fish, forage, and water. This provides a quantitative basis for moving toward growing the forest that will be of greatest benefit to the economy and the society, as well as forest owners, forest industries, and State and local governments in the South.

The fifth part of the study quantifies the economic opportunities for increasing timber supplies by treatment opportunity, management type, and ownership. This provides the data needed for selecting the treatments that will most economi-

cally achieve the kind of forest desired. It also provides the information necessary for assessing public and private options for increasing timber supplies.

The Forest Service has for a long time prepared periodic national studies of the timber situation that have included analyses for the South and the other major timber-producing regions. The last such study, "An Analysis of the Timber Situation in the United States, 1952–2030," was prepared in the late 1970's (USDA Forest Service 1982). In the early 1980's, new survey data and research on projection methodology indicated that the changes in the timber resource situation in the South were likely to be significantly different from those shown in this latest national analysis. The next national analysis of the timber situation will be prepared in the late 1980's. In view of the importance of the timber resource in the South and after discussions with representatives of Federal, State, and private forestry organizations, it was decided that a comprehensive new analysis—this study—was needed.[1]

Representatives of Federal and State forestry organizations, forest industries, forestry schools, and other major interests concerned with the timber situation in the South have provided advice, guidance, and technical and financial assistance for the study. The intent in making this a collaborative effort was to reach a broad consensus on the major timber resource problems and opportunities. It is hoped that with this consensus, the study can serve as an effective basis for guiding public and private timber policies and programs in the South during the rest of the century.

[1] This work, with respect to timber, is in compliance with Section 3(b) of the Renewable Resources Research Act of 1978, which directs the Secretary of Agriculture to ". . . make and keep current a comprehensive survey and analysis of the present and prospective conditions of and requirements for the renewable resources of the forest and rangelands of the United States and of the supplies of such renewable resources, including a determination of the present and potential productivity of the land, and of such other factors as may be necessary and useful in the determination of ways and means needed to balance the demand for and supply of these renewable resources, benefits and uses in meeting the needs of the people of the United States."

Literature Cited

Southern Forest Resources Analysis Committee. 1969. The South's third forest . . . How it can meet future demands. [Place of publication unknown]: Southern Forest Resources Analysis Committee. 111 p.

U.S. Department of Agriculture, Forest Service. 1982. An analysis of the timber situation in the United States, 1952–2030. For. Resour. Rep. 23. Washington, DC: U.S. Department of Agriculture, Forest Service. 499 p.

Acknowledgments

This study is the product of a collaborative effort among people in Federal and State forestry organizations, forest industries, forestry schools, and other major interests concerned with the forestry situation in the South.

An executive group provided guidance on the needs and concerns of the interests they represented, served as a communicating link with those interests, and made arrangements for experts to serve on ad hoc technical review groups. Members included: J. Lamar Beasley[1] (Chairman), Leonard A. Kilian, Jr. (South Carolina Forestry Commission), Arnett C. Mace, Jr. (School of Forest Resources and Conservation, University of Florida), William F. Milliken (Milliken Forestry Company, Inc.), Donald F. Smith (Boise Cascade Corporation), B. Jack Warren (Forest Farmers Association), Thomas H. Ellis (ex officio), and Dwight Hair (secretary). The executive group also helped resolve differing views about the study and provided advice and guidance on all parts of the study and the use of major study findings.

The author of chapter 1, The Economic Importance of Forests in the South, was Joan G. McAndrew. Richard A. Birdsey, Dennis M. May, William H. McWilliams, Herbert A. Knight, Cecil C. Hutchins, Jr., John B. Tansey, and Robert T. Brooks, Jr. (Tennessee Valley Authority) contributed data on the volume of roundwood timber products output. J. Michael Vasievich provided product price information for estimating the value of roundwood output. Staffs at each of the State forestry agencies in the South reviewed the volume and value data and suggested adjustments as necessary. The comparisons of timber products with other agricultural crops and other manufacturing industries updates earlier work by Bennett B. Foster. Warren A. Flick (Auburn University) developed the multipliers for estimating the impact of forest industry employment and wages and salaries on State economies.

The authors of chapter 2, The Changing Forest Resources and Forest Industries in the South, were Dennis M. Roth, H. R. Josephson (retired from the Forest Service), and Harold K. Steen (Forest History Society). Nearly all of the material in this chapter was abstracted from the detailed reports on various aspects of the forest history of the South listed in the first paragraph of chapter 2. Joan G. McAndrew, Karen L. Hanson, David E. Alligood, George N. Brooks, Linda Smith, Elinor Martin, David M. Belcher, William Thompson, Joan D. Miller, and John B. Tansey compiled and reviewed data for the supporting tables. William C. Siegel, Clifford A. Hickman and Terry K. Haines provided supporting material on forest taxation and legislation.

The principal authors of chapter 3, Projected Changes in the Timber Resource, were: Robert B. Phelps (basic assumptions and projected changes in demand), Ralph J. Alig (recent and projected changes in timberland area), and Herbert A. Knight and Richard A. Birdsey (recent and projected changes in timber resources). The projections of demand for timber products and roundwood were prepared by Richard W. Haynes. The Timber Assessment Market Model, used in making these projections, was developed by Darius M. Adams (University of Washington) and Richard W. Haynes. The projections of changes in timberland area and the Southern Acreage Model used in making these projections were developed by Ralph J. Alig. The projections of resource changes at the national and regional levels were prepared by Richard W. Haynes, Jonna C. Kincaid (University of Washington), Darius M. Adams, and John R. Mills. The Timber Resource Inventory Model used in making these projections was developed by Philip L. Tedder and Richard M. LaMont while at Oregon State University, and Jonna C. Kincaid. The projections of timber resource changes by State and the State Allocation of Regional Inventory Model, used in making these projections, were developed by Robert C. Abt (University of Florida).

The comprehensive and detailed timber resource data base used in projecting resource changes for chapter 3 was managed and compiled by Herbert A. Knight, Richard A. Birdsey, Joseph F. Glover, Anne W. Jenkins, Carolyn D. Steppleton, Larry A. Royer, and William H. McWilliams. The data base for estimating timber yields was compiled by Joe P. McClure and Herbert A. Knight. C. Denise Ingram, Timothy D. Marty, and Brian C. Murray assembled data and assisted in model development for projecting area changes.

The following experts from the forest industries, forestry schools, and State and Federal forestry agencies provided technical assistance in the development and testing of the models used in projecting resource changes, timberland area changes, and timber demands: Robert C. Abt, Edwin H. Barron (Texas Forest Service), Robert L. Bailey (University of Georgia), David M. Belcher, Robert T. Brooks, Jr., Ralph E. Colberg (Mead Corporation), Larry G. Davis (Champion International Corporation), Jerry J. Green (Buckeye Cellulose), Gerald T. Hamilton (Simpson Timber Company), Steve L. Harp (Georgia Kraft Company), Walter Jarck (Georgia Pacific Corporation),

[1] Named contributors are employees of the USDA Forest Service unless otherwise specified.

David N. Kelly (Florida Division of Forestry), William J. Lange (National Forest Products Association), Robert J. Lentz, David K. Lewis (Oklahoma State University), Andy J. Malmquist (Westvaco Corporation), Edward E. Mathews (Container Corporation of America), Thomas B. Montzka (Boise Southern Corporation), David B. Norris (Union Camp Corporation), Jeffrey T. Olson (Boise Cascade Corporation), Richard N. Pierson (Weyerhaeuser Company), Bryce E. Schlaegel, Robert W. Slocum, Jr. (American Forest Council), Don W. Smith (American Forest Council), Donald F. Smith (Boise Cascade Corporation), Karl E. Stoneking, William L. Wharton, Jr. (Scott Paper Company), and Herbert I. Winer (Mead Corporation).

These experts also provided information and guidance in developing the data used in these analytical systems, and particularly the data on timber yields and management intensity shifts used in the Timber Resource Inventory Model. The assistance received from these experts was substantive, and it has resulted in improvements that could not have been achieved without their participation.

The principal authors of chapter 4, Implications of the Projected Base Level Changes in the Timber Resource and of Other Selected Futures, were Richard W. Haynes and Dwight Hair. The price and product output projections of resource changes were prepared by Richard W. Haynes, Jonna C. Kincaid, and John R. Mills. The projections of employment and wages and salaries were prepared by Joan G. McAndrew and Fredrick W. Cubbage (University of Georgia). The projections of investments in forest management were prepared by J. Michael Vasievich. The projections of investments in plants and equipment were prepared by Clark C. Row and Perry R. Hagenstein (both from the Institute for Forest Analysis, Planning and Policy). Projections of wildlife populations were prepared under the direction of Thomas W. Hoekstra by Curtis H. Flather, projections of fish populations by Patricia A. Flebbe, projections of forage production by Linda A. Joyce, and projections of water quantities by Stanley J. Ursic. George E. Dissmeyer and Glen E. Brink also assisted in the development of these projections. The projections of changes in State and local governmental revenues were prepared by Clifford A. Hickman and William C. Siegel.

The author of chapter 5, Opportunities for Increasing Net Annual Timber Growth Through More Intensive Forestry, was J. Michael Vasievich. Peter D. Schroeder, C. Denise Ingram, Aurelia B. Harris, Timothy D. Marty, Joan G. McAndrew, and John B. Tansey assisted with data collection and analysis. Special data on potentials for timber on marginal cropland and pasture were provided by John H. Stierna, Paul E. Fuglestad, David Post, J. Jeffrey Goebel, and Terry Johnson (all of the USDA Soil Conservation Service). George F. Dutrow (Duke University) provided invaluable counsel and guidance on planning the study and the analysis of opportunities.

For chapter 5, data on forest practice costs, economies of tract size, timber market conditions, availability of vendor services, timber yields, site-preparation needs, regeneration methods, forest management treatments, and much of the other information necessary for analyzing economic opportunities by State were furnished by study groups formed in each State. The members of these State study groups follow:

Alabama:

C. W. Moody, Alabama Forestry Commission (chairman)
John M. Bradley, Jr., Resource Management Service, Inc.
Leonard G. Breeman, Hammermill Paper Company
Jerry L. Johnson, USDA Soil Conservation Service
William C. Jones, III, Alabama Forestry Association
Allen W. Layson, Weyerhaeuser Company
C. W. (Bill) McKee, Auburn University
Emmett F. Thompson, Auburn University

Arkansas:

Edwin E. Waddell, Arkansas Forestry Commission (chairman)
James H. Francis, Consulting Forester
James A. Gayle, International Paper Company (retired)
Richard A. Kluender, University of Arkansas at Monticello
Jim J. Neeley, Neeley Forestry Service, Inc.
B. J. Pavlovich, Arkansas Forestry Association
R. L. Willett, University of Arkansas at Monticello

Florida:

John M. Bethea, Florida Division of Forestry (chairman)
Boyd Close, Buckeye Cellulose Corporation
Duane R. Dippon, University of Florida
David N. Kelly, Florida Division of Forestry
Raymond K. Mason
H. W. Sapp, St. Regis Paper Company

Georgia:

John W. Mixon, Georgia Forestry Commission (chairman)
James I. Alfriend, Consulting Forester
Frederick W. Cubbage, University of Georgia
Lynn B. Hooven, Georgia Forestry Commission

S. B. Kinne, III, Georgia Kraft Company
Richard L. Malm, Union Camp Corporation
Albert A. Montgomery, Georgia State University
Gary L. Tyre, USDA Soil Conservation Service

Louisiana:

Michael P. Mety, Louisiana Office of Forestry (chairman)
Thomas A. Hansbrough, Louisiana State University
Robert C. Joslin
Donald F. Smith, Boise Cascade Corporation
Zebulon W. White, Zebulon White & Company

Mississippi:

Robert S. (Sid) Moss, Mississippi Forestry Commission (chairman)
Thomas J. Ebner, Weyerhaeuser Company
John G. Guthrie, Guthrie and Sons
Robert L. Izlar, Mississippi Forestry Association
Tom H. Monaghan, Mississippi State University
Douglas P. Richards, Mississippi State University
Gene A. Sirmon

North Carolina:

Harry F. Layman, North Carolina Division of Forest Resources (chairman)
Stephen G. Boyce, Forestry Consultant
Eric L. Ellwood, North Carolina State University
C. Robert Grady, North Carolina Division of Forest Resources
Jay Carl Jessup, Jr., Weyerhaeuser Company
George A. Olson
Henry Plotkin, Forestry Consultant
R. R. ''Bob'' Richardson, Federal Paper Board Corporation
Jerry G. Williams, Coastal Lumber Company

Oklahoma:

Roger L. Davis, Oklahoma Forestry Division (chairman)
Kurtis L. Atkinson, Oklahoma Forestry Division
John C. Burwell, Oklahoma Forestry Association
Stanley B. Carpenter, Oklahoma State University
Michael J. Dahlem, Weyerhaeuser Company
Dave Elkin, Weyerhaeuser Company
Quintus H. Herron, Herron Industries
Edgar R. Hurliman, Forestry Consultant
Robert M. LaVal
David K. Lewis, Oklahoma State University

South Carolina:

Leonard A. Kilian, Jr., South Carolina Forestry Commission (chairman)
Joseph M. Crockett, Westvaco Corporation
William F. Milliken, Milliken Forestry Company, Inc.
C. R. Nichols, South Carolina Forestry Commission
Steve K. Nodine, Clemson University

Tennessee:

Roy C. Ashley, Tennessee Division of Forestry (chairman)
Hart W. Applegate, Tennessee Division of Forestry
James H. Hill, Hiwassee Land Company
Charles E. McGee
David M. Ostermeier, University of Tennessee

Texas:

Bruce R. Miles, Texas Forest Service (chairman)
Kent T. Adair, Stephen F. Austin State University
Glenn A. Chancellor, Temple-EasTex, Inc.
Tom L. Hart, Champion International Corporation
Ed D. Holcombe, USDA Soil Conservation Service
Ron H. Hufford, Texas Forestry Association
Jay O'Laughlin, Texas A. & M. University

Virginia:

James W. Garner, Virginia Division of Forestry (chairman)
T. Nelson Flippo, Flippo Lumber Corporation
Sharon R. Miller, Chesapeake Corporation
David A. Tice, Mid-Atlantic Forestry Services, Inc.
Harold W. Wisdom, Virginia Polytechnic Institute and State University

Members of the State study groups also reviewed study material as it was developed. The review comments and suggestions of these groups were particularly helpful in developing the timberland area projections.

The general planning, direction, and management of the study were by Dwight Hair. Joan G. McAndrew contributed in many important ways including writing and revising text, planning graphics and other artwork, and managing the preparation of the review and final drafts of the study. Janet S. Wintermute edited the study. Syble M. Kincannon provided the primary support assistance for the preparation of graphics, text, and other materials. Joan D. Miller, Johnetta I. Wormley, Loida Del Rio, Rachel G. Redmon,

Sharon C. Johnson, Peggy E. Gwinn, Alice H. Ulrich, Linda D. Rodgers, Steven R. Boutcher, Seabelle J. Ball, Laurie Garnett, and Renee Y. Blue provided assistance on major parts of the study.

Many others have provided support and assistance for this study. The authors specifically want to express their appreciation for this help to John E. Alcock, J. Lamar Beasley, Robert E. Buckman, Thomas H. Ellis, Thomas E. Hamilton, H. Fred Kaiser, Jr., William J. Lange (National Forest Products Association), and Donald F. Smith (Boise Cascade Corporation).

Contents

Page

Highlights 1

Chapter 1: The Economic Importance of Forests in the South 9

Overview of the Importance of the Forest Resource 10

Timberland Area Location 12
Location by Region and State 12
Comparison With Cropland and Pasture 12
Major Forest Management Types 12
Ownership Characteristics 13

Volume and Value of Roundwood Timber Products 14

Estimates of the Volume and Value of Roundwood Timber Products 14
Relative Importance of Products 15
Relative Importance of Regions and States 16

Value of Timber Products Compared With That of Agricultural Crops 18

Contribution of Forest Industries to the Southern Economy 20

Scope of Forest Industry Manufacturing 20
Contributions to the Economy Southwide 20
Comparisons With Other Manufacturing 21
Relative Importance of Forest Industries by Type 23
Relative Importance of Forest Industries by Region and State 24
Recent Trends for Forest Industries in the South 25
The Importance of the South for Forest Industries Nationwide 27

Literature Cited 28

Chapter 2: The Changing Forest Resources and Forest Industries in the South 29

The Lessons of the Past 30

Page

Early Use of Southern Forests 31

Commercial Uses of Southern Forests 32

Expansion of the Lumber Industry 35

Softwood Lumber Production 37
Hardwood Lumber Production 37
Technological Breakthroughs 37

Development of Conservation Programs 38

The Weeks Law 40
Lumber Trade Associations 40
The Clarke–McNary Act 41
Reforestation and Wildlife Habitat Improvement 41

Forest Fire Control in the South 43

Woods-Burning vs. Fire Protection 43
Fire Protection in the Thirties and Forties 46
Prescribed Burning 46
Research and Educational Efforts 46

Reforestation Programs 48

Federal Assistance for Reforestation 48
State Reforestation Programs 49
Reforestation Trends 50

Forestry Research 51

Funding 51
Timber Management Research 53
Inventory and Economics Research 54
Insect and Disease Research 54
Fire-Related Research 54
Forest Products and Utilization Research 55
Other Research 55
University Research 55
Industry Research 57

Forestry Education and Extension 57

Role of Extension Programs 57
Continuing Education Programs 58
Influence of Professional Organizations and Industry 59

Page

Technical Assistance in Forest Management and Utilization . . . 59

Role of State Service Foresters . . . 60
Forestry Industry Assistance . . . 60
Consulting Foresters . . . 61
Effectiveness of Assistance Programs . . . 61

Insect and Disease Control . . . 63

Taxation Modifications . . . 65

State Forest Tax Laws . . . 65
Federal Taxes on Timber . . . 65

National Forest and Other Public Land Management . . . 67

Expansion of the Forest Industries and Industrial Forestry . . . 71

The Pulp and Paper Industry . . . 71
Timber Sources for the Forest Industries . . . 72
Industrial Foresters . . . 73
Forestry Associations . . . 73
Products Overview . . . 75

Nontimber Uses of Timberlands . . . 77

Stumpage Price Trends in the South . . . 78

Concluding Observations . . . 81

Literature Cited . . . 81

Chapter 3: Projected Changes in the Timber Resource . . . 83

Timber Resource Projection Methods . . . 84

Projection Models . . . 84
Equilibrium Conditions . . . 85
Data Base . . . 85
State-Level Projections . . . 86

Timber Resource Projection Assumptions . . . 87

Population . . . 87
Economic Activity and Income . . . 89

Page

Institutional, Technological, and Other Changes . . . 90
Trends in Timber Use and Projected Demands . . . 90
Trade in Timber Products . . . 107
Demands on U.S. Timberland . . . 109
Assumptions on Area of Timberland . . . 109
Assumptions on Timber Yields . . . 128
Other Assumptions . . . 130

Recent and Projected Hardwood Timber Supplies . . . 131

Southwide Trends . . . 131
Trends in the Southeast . . . 137
Trends in the South Central Region . . . 139
Trends by State . . . 141

Recent and Projected Softwood Timber Removals . . . 142

Southwide Trends . . . 142
Trends in the Southeast . . . 145
Trends in the South Central Region . . . 145
Trends by State . . . 145

Recent and Projected Softwood Net Annual Growth . . . 148

Southwide Trends . . . 148
Trends in the Southeast . . . 148
Trends in the South Central Region . . . 152
Trends by State . . . 154
Southwide Summary of Softwood Growth Trends . . . 154

Recent and Projected Softwood Growth–Removal Balances . . . 156

Recent and Projected Softwood Inventories . . . 156

Southwide Trends . . . 156
Trends in the Southeast . . . 158
Trends in the South Central Region . . . 161
Trends by State . . . 164

Recent and Projected Hardwood Timber Supplies . . . 164

Southwide Trends . . . 164
Trends in the Southeast . . . 165

Page

Trends in the South Central Region 171
Trends by State 171

Recent and Projected Hardwood Timber Removals 174

Southwide Trends 174
Trends in the Southeast 177
Trends in the South Central Region 177
Trends by State 179

Recent and Projected Hardwood Net Annual Growth 181

Southwide Trends 181
Trends in the Southeast 181
Trends in the South Central Region 183
Trends by State 183

Recent and Projected Hardwood Growth–Removal Balances 184

Recent and Projected Hardwood Inventories 184

Southwide Trends 184
Trends in the Southeast 186
Trends in the South Central Region 189
Trends by State 191

A Qualified View on Projected Changes in Timber Resources 193

Literature Cited 194

Chapter 4: Implications of the Base Projections of Changes in the Timber Resource and of Other Selected Futures 197

Economic and Environmental Implications of the Base Projections of Resource Changes 198

Sawtimber and Pulpwood Stumpage Prices 198
Lumber and Plywood Production and Pulpwood Consumption 202
Softwood Lumber Imports 203
Employment and Wages and Salaries in the Forest Industries 203

Page

Investments in Forest Management 204
Investments in Plants and Equipment 205
State and Local Government Revenues 205
Forage, Wildlife and Fish, and Water 205

Resource, Economic, and Environmental Implications of Other Futures 209

Improved Processing Efficiency 210
High Exports of Timber Products 211
High Imports of Timber Products 213
Reduced Timberland Area 215
Reduced Timber Growth 216
Reduced National Forest Timber Harvest 219
Natural Regeneration on Marginal Cropland and Pasture 220
Planted Pine on Marginal Cropland and Pasture 221
Economic Opportunities on Timberland in Private Ownership 221
All Economic Opportunities on Private Lands 224
Increased Management Intensity on Forest Industry Timberlands in the Douglas-fir Region 226
Highlights of the Implications of Resource Changes 228

Literature Cited 230

Chapter 5: Opportunities for Increasing Timber Supplies Through More Intensive Forestry 231

Economic Opportunities To Increase Timber Supplies on Timberland 232

Data Base, Analytical Structure, and Assumptions 232
Area of Timberland With Economic Opportunities To Increase Net Annual Timber Growth 239
Potential Increases in Net Annual Growth With Utilization of Economic Treatment Opportunities 241
Investment Opportunities To Increase Net Annual Growth 243
Economic Opportunities To Increase Net Annual Timber Growth With Constant Stumpage Prices 244

Page

Economic Opportunities To Increase Net Annual Timber Growth That Would Yield 10 Percent or More on the Investments 244
Economic Opportunities To Increase Net Annual Timber Growth, by State 247

Opportunities To Increase Net Annual Growth on Marginal Cropland and Pasture 250

Opportunities on Marginal Cropland and Pasture 250
Opportunities on Highly Erodible Cropland 252

A Qualified View of the Opportunities for Increasing Timber Supplies 254

Market Imperfections—Causes and Implications 255

Literature Cited 256

Appendix 1 . . . .

Appendix 2 . . . .

Appendix 3 . . . .

Appendix 4 . . . .

Appendix 5 . . . .

List of Figures . . . .

List of Tables Within Chapters . . . .

List of Tables Within Appendices . . . .

Glossary of Terms . . . .

Highlights

The basic purpose of this study of the timber situation in the South is to determine what kind of forest is evolving, what kind of forest will be of greatest benefit to the society, and how can it be economically achieved.

Given these broad objectives, the study is primarily concerned with recent and prospective trends in the timber resource; the economic, social, and environmental implications of these trends; and the opportunities to manage and use the forest resource in ways that will sustain the forest sector of the economy while protecting and enhancing the forest environment. The study also describes the forest resource base, the economic importance of timber and the forest industries, and the policies and programs that have been effective in regenerating forests in the South.

1. There is a very large forest resource in the South.

There are over 182 million acres of forest in the South classified as timberland suitable and available for growing crops of trees. Timberland is the predominant land use: it accounts for 2 to 3 out of every 5 acres in all of the Southern States, including eastern Texas and Oklahoma.

Southwide, there are more acres in timberland than in cropland and pasture combined. The 85 million acres of timberland in the Southeast region represent 58 percent of that region's land area and more than twice the area of cropland and pasture. In the South Central region, including eastern forested parts of Texas and Oklahoma, there are 97 million acres of timberland and 65 million acres of cropland and pasture. Fifty-three percent of the land area in the South Central region is timberland.

The South's timberland is composed of a diversity of forest management types. Approximately one-third of the area is covered by pine types—41 million acres in natural pine stands and another 21 million acres in planted pine. Loblolly pine is by far the most abundant species. It occurs in natural stands in most sections of the Coastal Plain and Piedmont, where it has frequently seeded in on idle cropland and pasture. These stands usually contain substantial numbers of hardwood species as well.

Across much of the South, pine stands represent a transitional stage in natural succession to hardwood forest types. Mixed pine–hardwood stands occupy 27 million acres, or 15 percent of the timberland in the South. Typically, these stands are 50 percent or more oak and 25 to 50 percent pine.

Hardwood forest types occupy over half the timberland area in the South, 93 million acres. Two-thirds of this area is classified as upland hardwoods. A typical upland hardwood association includes oaks and hickories, with gum, yellow-poplar, elm, and maple.

There are 30 million acres of bottomland hardwoods in the South, about 17 percent of the timberland. Over half of these bottomland forests are located along the alluvial floodplains of the major rivers in Louisiana, Florida, Georgia, and Mississippi. Oak–gum–cypress is the typical association on these sites, with such species as willow, water, laurel, swamp chestnut and cherrybark oaks; water tupelo; blackgum and sweetgum; and baldcypress.

2. Of the timberland in the South, 90 percent is privately owned.

Some 164 million acres, or 90 percent, of the timberland in the South is in private ownership. The bulk of this area, 122 million acres, is in "other private" ownerships—other than forest industry. This category is diverse: it includes farmers and all other individuals, and corporations that do not run wood-processing plants. Corporate owners include a variety of organizations holding timberland property as an investment, recreational area, or for other purposes, such as utility companies, railroads, realty firms, hunting clubs, insurance companies, and banks.

Farmers own 40 million acres of timberland, corporate owners 16 million acres, and other private individuals 66 million acres. These acreages represent approximately one-fourth, one-tenth, and one-third, respectively, of all the timberland in the South.

Forest industries hold 42 million acres, slightly less than one-quarter of the total area of timberland. This category includes companies or individuals that operate primary wood-using plants and either own timberland or hold a long-term lease on such land.

About 60 percent of the 18 million acres of publicly owned timberland in the South is in national forests. The rest is in State forests and wildlife refuges and other Federal, State, and municipal county lands.

3. There are large timber inventories in the South.

In 1985 the softwood timber inventory in the South was 102 billion cubic feet. This inventory was about equally divided between the Southeast and the South Central regions. There was an additional 119 billion cubic feet of hardwood timber, which was also about equally divided between the regions.

As with timberland area, the timber inventory is concentrated on the other private ownerships—these contain 73 percent of the hardwood and 61 percent of the softwood inventories. Another 16 percent of the hardwood inventory and 26 percent of the softwood inventory were on forest industry ownerships. Most of the remaining inventories were on the national forests.

4. Timber is the most important agricultural crop in the South. It has twice the value of soybeans or cotton and three times the value of tobacco, wheat, or corn.

In 1984, an estimated 7.5 billion cubic feet of roundwood timber products—sawlogs, veneer logs, pulpwood, fuelwood, and other round products—were harvested from the forests in the South. Over 5 billion cubic feet of this volume came from softwood species, primarily southern pine, and nearly 2.5 billion cubic feet came from a variety of hardwood species. The value of standing timber or the trees from which these products were cut in 1984 was over $3 billion, $2.7 billion for softwoods and $0.4 billion for hardwoods. This amount, the stumpage value, represents the value that landowners received from the sale of timber.

When the value added from harvesting the timber and transporting it to rail sidings, concentration yards, or other local points of delivery is included, the value of roundwood timber output in the South was $6.1 billion in 1984. The value of softwood products was approximately $4.5 billion, that of hardwood products, $1.6 billion. The $6.1 billion of roundwood timber products in 1984 was twice the value of soybeans or cotton produced and three times the value of tobacco, wheat, or corn crops in the South (all values at local points of delivery). With a few exceptions, the value of the timber harvest exceeded the value of these crops State by State as well. Compared to total production Southwide, there was $1 of roundwood timber output for every $3 dollars of other crop production.

Timber harvested in 1984 ranked among the top three agricultural crops in terms of value of production in all 12 Southern States. It was first in value in six States—Virginia, South Carolina, Georgia, Alabama, Mississippi, and Louisiana. In Alabama, roundwood timber products almost equaled in value the total for all other crops. In the other five States, the value of roundwood products was equivalent to two-fifths to three-fifths of other crop values.

5. Employment and income in the forest industries in the South exceed those in other major manufacturing industries.

In relationship to all manufacturing in the South in 1982, forest industries employed one out of every nine workers, paid $1 out of every $10 in wages and salaries, and produced $1 out of every $11 of value added to the economy by manufacturing. Aggregate employment and income in the forest industries across the South exceeded those in other major manufacturing industries, such as textiles, apparel, processed food, chemicals, electric and electronic equipment, nonelectrical machinery, and transportation equipment, including ships, boats, and aircraft.

Although the industrial base of individual States varies across the South, forest industries represent a leading sector in nearly all States. Forest industries rank first or second in importance among major industry groups in most States in the South.

Forests and forest industries are clearly of great importance to the economy and society of the South. It is also clear that they have been increasing in importance in recent decades.

6. The present economic importance of forests in the South reflects a great achievement in the history of forestry—the regeneration and growth of the second and third forests.

To the first settlers in the South the forest was an unending wilderness—an obstacle to the use of the land for crops, grazing, and living space. But it also provided fuel and raw material for houses and furniture and commerce. Thus, as the population grew and the need for timber products and crop and grazing land expanded, increasing areas of forest land were cleared. The conversion continued until shortly after World War I.

Timber harvesting was not a major factor affecting the forests until after the Civil War. But as railroads were extended into the vast pine forests on the Coastal Plain, the technology for sawing large volumes of timber was put into practice; and, as huge markets for lumber developed in the Midwest and Northeast, timber harvesting accelerated. From about the 1880's until the 1920's, very large areas were harvested. Some of this land was used for crops and much bigger areas for pasture. Because of such use and the uncontrolled fires that burned over large areas each year, only a part of the cutover lands came back to forests.

Some did, however, and the early 1900's marked the beginning of what became the South's second forest—the forest that supplied the wood for the expansion of the pulp and paper industry in the 1930's and on into the 1960's.

As the second forest was developing, changes in land use began to have major impacts on the forest situation. By the early 1920's, the use of land for crops and pasture peaked and started to decline. Concern among forest industry and government leaders about timber supplies and the lack of regeneration of large areas of cutover lands led to (1) the development of programs of fire protection, technical and financial assistance, research, and education; and (2) the establishment of managed public, industry, and other private forests. Fire protection and the educational programs associated with fire prevention were particularly effective, and a large part of the cutover and idle cropland and pasture regenerated naturally to pine and mixed pine–hardwood stands. Research that led to ways to protect, regenerate, and manage forests and utilize southern pine timber for products such as pulp and plywood also had major impacts on the resource and forest industries.

These same forces continued to affect the timber situation for several decades. The programs of protection, technical and financial assistance, research, education, and management of private and public forests expanded, sometimes rapidly, from the 1940's through the 1970's. The area of land used for crops and pasture continued to drop through the 1950's, sometimes at rapid rates, and much of this land regenerated naturally.

This combination of events led to what is surely a great achievement in the history of forestry, the regeneration and the growth of the South's third forest. This forest is the source of the wood used by the forest industries that are now such a important part of the economy of the South. It will continue to be the source of timber harvests until around the end of the century.

7. Although great progress has been made, the situation is changing. Net annual timber growth has begun to decline.

Although the timber situation in the South has shown great improvement, there are now changes underway that are of great significance. The most recent surveys of forests conducted by the Forest Inventory and Analysis research units in the South show that net annual timber growth for softwoods and hardwoods, after rising for decades, has begun to decline.

There are four major causes of the decline in softwood growth. One important factor since the 1960's has been the lack of adequate regeneration of pine stands after harvest on lands in other private ownerships. The natural succession after harvest in most of the pine stands in the second and third forests is to mixed hardwoods and pine or to hardwoods. Many of the other private owners have been accepting whatever species nature provides. As a result, the latest cycle of forest surveys shows a 30- to 50-percent decline in the numbers of pine saplings on these ownerships. This decline has been going on long enough to be reflected in net annual growth.

A second factor acting to reduce net annual softwood growth is an increase in volume of mortality and cull trees. Over the last 10 years, for example, annual pine mortality in the South has about doubled. Roughly 15 percent of the gross annual growth of pine is now lost to mortality, compared to 9 percent 10 years ago. Much of this increase in mortality can be attributed to epidemics of pine bark beetles. Suppression of overtopped trees because of increasing stand density has been another important factor. Much of the increase in cull volume is attributable to increasing stand age.

The third important factor affecting net annual softwood growth has been a drop in radial growth on natural stands in the Piedmont and Mountain regions of Georgia, South Carolina, North Carolina and Virginia. In these regions, average annual radial pine growth has been some 20 to 30 percent lower during the last 10 years than in the preceding 10-year period. There is also evidence of decline on the Coastal Plain.

The fourth factor, affecting both hardwood and softwood net annual growth, has been the conversion of timberland to cropland and pasture and urban or other nontimber uses. Since the early 1960's, the area of timberland in the South has declined from 197 million acres to 182 million. Approximately one-third of the loss can be attributed to the conversion of hardwood bottomlands to cropland, particularly in the Mississippi Delta. Most of the loss, however, was from pine stands in other private ownerships.

All of these factors affecting net annual growth are the result of forces not easily or quickly changed. And even when they are changed, it will take time for the effects to show as a measurable increase in net annual growth. The effects of regeneration after harvest on the other private ownerships, for example, would not show up for a decade or so; it would take that long for the trees to reach 5 inches in diameter at breast height, the minimum tree size used

in measuring net annual growth. Thus it is inevitable that the recent trends will continue for a while. Only time and large increases in current management programs, especially the regeneration programs, can turn these trends around so that net annual growth is rising again.

8. Timber removals have been rising rapidly because of increased harvests. For softwoods, removals exceed net annual growth over large areas in the South.

During the last two and a half decades, timber removals in the South have increased very rapidly to meet the Nation's expanding needs for wood products. As a result of increased removals and declines in growth, softwood timber removals are now above net annual growth over large areas in the South. Net annual hardwood growth is still above removals, but the trends are converging.

As with net annual growth, the longrun trends in timber removals are the result of forces that are not easily or quickly changed. Thus the trends in timber removals are also likely to persist for a time.

9. The base projections in this study show timber removals rising above net annual growth and inventories declining—in the 1990's for softwoods and beyond 2000 for hardwoods. Softwood net annual growth is increasing again by 2000; hardwood growth, by 2020.

The base projections in this study—the projections that reflect the consensus judgment of the technical experts involved about the most likely future changes in demand and supply determinants—show that the trends in net annual growth and removals do persist. Net annual growth of softwoods declines until the early 1990's, and that for hardwoods until after 2010. Beyond those times, net annual growth rises again.

The increases in net annual timber growth result from a level of investments in management that is much above that of today. By 2030, the area in pine plantations is more than doubled; large areas of mixed pine–hardwoods and upland hardwoods are converted to pine. Planting or conversion of these areas to pine would require additional investments on private lands of $2.7 billion, with most of the investment occurring within the next 15 years. Substantial increases in timber yields and in the intensity of management are also assumed for large areas of pine plantations. Thus, the base projections of net annual growth reflect what would happen if there continues to be major progress in forestry in the South and continued expansion in the technical and financial assistance, protection, research, education, and management programs that have brought about the improved forestry situation in the past.

Timber removals continue to rise through the projection period although at a slower rate than during the last couple of decades. Softwood removals rise above net annual growth and softwood timber inventories decrease from the mid-1980's until near 2000, when a slow increase begins. At the end of the projection period, inventories are still below the level reached in 1985. Hardwood inventories rise until 2000, then fall through the rest of the projection period when removals are above net annual growth.

These base projections show the direction things are heading—what is likely if current expectations about economic growth, changes in timberland area, the establishment of pine plantations, management investments, and all the other factors that affect timber demand and supply are realized. The projected changes are not inevitable, however. The present outlook can be changed, and there are important reasons to do so.

10. The base projections of resource change mean that the South is facing a future of rising stumpage and roundwood product prices, much lower rates of growth in timber harvests, and declines in employment and wages and salaries in the forest industries.

Among the economic consequences of the projected changes in the timber resource are rising real prices of stumpage, i.e., prices net of inflation or deflation. The increases in the two southern regions are largest in the early part of the projection period, the time in which softwood timber inventories are declining. Between 1984 and 2000, for example, softwood sawtimber prices rise at an annual rate of 3.2 percent in the South Central region. After 2000, as inventories begin to rise, the rates of increase slow down. Between 2020 and 2030, increases in the South Central region average only 0.5 percent per year.

Softwood pulpwood stumpage prices in both regions rise at about the same rate as sawtimber prices in the early part of the projection period until 2000. They increase slowly during the next two decades, and by the decade from 2020 to 2030, pulpwood stumpage prices are rising at a 3.5 percent annual rate in the South Central region.

Hardwood stumpage prices show much different trends from those for softwoods. Prices for hardwoods decline in both the southern regions until 2000. They show similar trends in the northern regions. These trends reflect the availability of large and increasing inventories of hardwood timber. Af-

ter 2000, as timber removals rise above net annual growth and inventories begin to decrease, prices begin to rise. In the last two decades of the projection period, prices are going up at a rate of 1.4 percent per year in the South Central region and 1.2 percent in the Southeast.

These projected prices increases for hardwood sawtimber stumpage are for the smaller, lower quality hardwood timber that composes the bulk of the hardwood timber inventories. The stumpage price outlook for larger hardwood timber of preferred species, such as select white and red oak, ash, and black cherry, is different. Removals of higher quality sawtimber of most preferred species have been close to or above net annual growth in recent decades, and there have been large increases in stumpage prices in the past. This situation seems likely to continue.

Increasing stumpage prices are reflected in the prices of sawlogs, pulpwood, and the other round products used by the forest industries. These roundwood price increases, which represent increased costs to the processing industries, are passed on in the prices of products, especially lumber and softwood plywood, where stumpage represents a large part of the product cost.

Rising real prices of stumpage and roundwood products have important economic, social, and environmental implications. In the highly competitive markets in which nearly all timber products are sold, rising prices act to constrain demands. As a result, softwood timber supplies (harvests) rise slowly over the projection period, much below the increases since the early 1960's. Hardwood harvests rise in the first three decades; then they level off and begin to decline.

The increases in harvests are too small to sustain employment in the forest industries in the South. Rising productivity per employee overrides the increases in harvests. After 1990, employment drops; by 2030 total employment in the lumber and wood products and pulp and paper products industries will be 21 percent, some 85,000 people, below the employment level of 1984. Total wages and salaries also start to decline after 2000.

The drop in employment and wages and salaries in the forest industries is of great economic significance in the South. The effects of reduced employment will be multiplied as they spread through the trade, service, transportation, and other parts of the southern economy that provide goods and services to the forestry sector. It is currently estimated, for example, that a loss of one job in the lumber and wood products industry would result in a decrease of 2.3 jobs throughout the economy in Southern States; a one-job loss in the pulp and paper products industry would be multiplied 2.6 times as other parts of the economy were affected.

Rising real prices have other important implications. Exports of most timber products are determined largely by the capability of domestic producers to compete on a price basis with producers in other countries. Consequently, rising real prices will constrain timber export potential.

As stumpage and timber product prices rise relative to other materials, use of substitute products such as concrete, steel, aluminum, and plastic will increase above the levels that would have otherwise prevailed. The mining, industrial processing, and power generation associated with increased use of timber substitutes will result in more air and water pollution. Thus, as timber prices go up, environmental costs will also rise.

Consumers—and this includes everyone in our society—will be adversely affected by rising real prices. Home buyers will bear most of the increased costs both in terms of higher prices and in adverse impacts on the number, size, and quality of dwelling units built.

Rising prices and the associated economic and environmental impacts are not inevitable. They simply show what is likely to happen if current expectations about the future timber situation materialize. The development of the South's fourth forest can be managed, and the forest can take almost any form desired.

11. There are very large opportunities to increase forest productivity in the South and to sustain the forest industries and employment and wages and salaries.

There are now economic opportunities (those that would yield 4 percent or more net of inflation or deflation) to increase net annual timber growth on 70 million acres of timberland in the South. If utilized, these opportunities would, in time, increase net annual timber growth by 3.2 billion cubic feet a year, a volume equal to 57 percent of current net annual softwood growth. Most of the opportunities to increase timber growth on timberland in the South—2.3 billion out of 3.2 billion cubic feet—are on the other private ownerships. There are, however, opportunities on all ownerships, including 0.6 billion cubic feet on forest industry ownerships. The relatively small potential on the public ownerships—0.3 billion cubic feet—largely reflects the fact that little timberland is publicly owned in the South.

Just over half—1.8 billion cubic feet—of the opportunities to increase timber growth on timberland are in the South Central region. There are economic opportunities to increase net annual timber growth by over 0.2 billion cubic feet a year on timberland in every State in the South except Oklahoma and South Carolina. The largest potential—0.5 billion cubic feet—is in Alabama.

Nearly half of the economic opportunities to increase net annual timber growth are in stands of the upland hardwood types. Most of the remainder is on natural pine and mixed pine–hardwood stands. Nearly half of the opportunities for increasing growth involve regenerating (with site preparation) nonstocked or cutover sites. Most of the rest involve either the harvesting and regeneration of mature stands or stocking control, cleaning, or release of stocked stands.

The total additional investment required to utilize the economic opportunities to increase net annual growth on timberland is $6.9 billion. The largest part of this, about three-fifths, would fund regeneration with site preparation. Although the needed investments are large, the rate of return on the investments would equal or exceed 4 percent, which approximates the longrun rate of return on investments in the private sector of the U.S. economy.

There are additional opportunities to increase net annual timber growth in the South. There are currently 22 million acres of cropland and pasture that would yield higher rates of return to the owners if planted to pine. This includes nearly 8 million acres of highly erodible cropland that is suitable for growing trees. In a sense, all of these 22 million acres are marginal for crop and pasture use. If planted to pine, they would produce about 2.1 billion cubic feet of net annual timber growth.

About three-fifths of the opportunities on marginal and highly erodible cropland and pasture are in the South Central region. There are substantial opportunities in all Southern States. In most States the potential is above 100 million cubic feet a year.

In making the base projections, it was assumed that a little over a third of the opportunities to increase net annual growth would be implemented over the projection period. However, the investments have not yet been made, and the opportunities as described do exist at this time.

In total, net annual timber growth in the South could be increased by 5.3 billion cubic feet if all the economic opportunities were utilized and the marginal and highly erodible cropland and pasture were planted to pine. This would nearly double current net annual softwood growth, and it is enough timber to sustain the forest industries in the South and employment and wages and salaries.

Achieving the potential increase in timber growth would have very positive benefits for the South. It would help the region's general economy because the effects of employment in the forestry sector are multiplied in the trade, service, and transportation sectors, and other parts of the economy. Currently it is estimated that total employment is increased by about 2.3 jobs for each job in the lumber and wood products industry and by 2.6 jobs for each job in the pulp and paper products industry.

Acheiving the full potential for greater timber growth would also have important national impacts. Consumers would pay less for timber products.

12. Achieving the economic potential to grow a fourth forest in the South will require large increases in protection, technical and financial assistance, research, education, and management programs.

There is clearly the economic potential to grow a fourth forest in the South that can sustain much larger timber harvests. But only a limited part of this potential is likely to be realized. This may be due in large part to market imperfections in the forestry sector. The free market system that so effectively guides the production of most goods and services works in only, a limited way in increasing timber supplies. For example, the best available data show that for each 10-percent increase in stumpage prices, there is less than a 4-percent increase in supplies.

This limited response to price changes largely reflects the characteristics of private timber owners other than forest industries. Various studies have shown that these owners have widely diverse objectives and attitudes; limited technical knowledge of the ways timber stands should be marketed, harvested, regenerated, and managed; and varying willingness and capacity to make investments in management practices. Ownership tenures are typically short, and most owners are in the older age groups. Thus, for timber, where the time between investments and harvest is long, there is the likelihood that direct benefits, such as income from timber sales, will not accrue to many current owners.

In the past, society has taken action to increase timber supplies by supplementing market forces, although the limited response of supplies to price changes has not been explicitly recognized as the reason in any of the forestry legislation, and in only a limited way in the forestry

literature. Nearly all forestry legislation—the public programs of protection, technical and financial assistance, research, education, and public ownership—and many forest industry programs are in fact societal adjustments designed to supplement the market system and increase timber supplies.

By any standard, these policies and programs have worked. They have resulted in the regeneration of the second and third forests in the South and made possible the development and growth of the forest industries, which now constitute such an important part of the South's economic base. The programs have also been efficient—the benefits exceed the cost—and they have been effective in increasing the income of timberland owners. If future employment and income in the forest industries are to be sustained, action must be taken to expand both the public and private programs that are effective in increasing timber supplies. This can be done in a variety of ways, but it must be done if the timber resource in the South is to maintain its important place in the economy of the South.

Chapter 1

The Economic Importance of Forests in the South

There are more acres of land in timber in the South than in cropland and pasture combined. Over half of the land area in 10 Southern States and in eastern Texas and eastern Oklahoma is in timberland.

Overview of the Importance of the Forest Resource

Approximately 40 percent of the timberland in the United States is located in the South. This area includes the States of Virginia, North Carolina, South Carolina, Georgia, and Florida in the Southeast region and the States of Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas in the South Central region (frontispiece). The term "timberland" refers to forested land that is capable of producing at least 20 cubic feet of wood per acre annually and that has not been withdrawn from utilization for timber by law or administrative regulation. In many Southern States, timberland covers over 50 percent of the land area.

In 1976, the latest year for which comparable nationwide data are available, the South supported over 20 percent of the softwood growing stock and over 40 percent of the hardwood growing stock in the United States (USDA Forest Service 1982). This inventory accounted for half of the net annual growth for both softwoods and hardwoods nationwide. Net annual growth is affected by both timberland area and the growth and mortality of individual trees. The favorable position of the South compared to other regions, particularly for softwood growth, reflects its extensive area of productive timberland and its relatively young stock of growing trees.

The diversity of its timber resource has made the South a major producer of virtually all forest products. In 1984, the 12 Southern States accounted for one-third of the softwood lumber and over two-fifths of the hardwood lumber produced nationally. These States also accounted for close to half of national production of hardwood and softwood plywood and two-thirds of the woodpulp (USDC Bureau of the Census 1985).

Southern forests provide many benefits in addition to timber. They play a vital role in the social, cultural, and economic life of the people in the South. In 1985, they produced nearly 8 million tons of forage for domestic livestock and wildlife. They protect watersheds on over half the land area in the South, and are the source of water for much of the domestic and industrial use. They provide habitat for nearly all wildlife and fish species. They also provide sites for recreation for tens of millions of people. For example, according to the 1985 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (USDI Fish and Wildlife Service and USDC Bureau of the Census unpubl.), over 70 percent of the population in the South (16 years of age and older) participate in wildlife-related activities such as observing, photographing, or feeding wildlife. Nearly one-third of the population engage in hunting or fishing. A substantial proportion of these activities occurs on timberland.

In fiscal year 1986, the value of activities such as hunting, fishing, nature study, camping, picnicking, hiking, water sports, and other recreational activities on national forest lands in the South was estimated to be over $124 million. These lands represent only 6 percent of the total timberland area in the South. Millions of acres of forest industry and other private timberland are also being managed for wildlife and profitably leased for hunting. The fish and wildlife, forage, water, and recreation benefits associated with timberland are also important to State and local economies. For example, hunters and fishermen spend money in local communities for food, lodging, transportation, and fees for access to hunting and fishing areas. In 1980, approximately $750 million was spent on these items in the 12 Southern States by hunters of forest-related species such as deer, wild turkey, raccoon, and squirrel (USDI Fish and Wildlife Service and USDC Bureau of the Census 1982). Another $85 million was expended by trout fishermen, who depend on the cold-water streams commonly found on timberland. These figures do not include the substantial amounts spent by sporting enthusiasts for numerous other items ranging from specialized equipment to magazine subscriptions.

Of all the benefits associated with forests, however, timber is usually considered the most important in economic terms. Timber generates income and employment throughout the South's economy, not only in jobs directly related to timber management, harvesting, and processing of primary wood products but also in the manufacture of all products containing wood or wood fiber, and in wholesale and retail trade, transportation, and construction. Virtually every household and business comes into daily contact with timber products in building materials, furniture, cabinets, paper, containers and boxes, and thousands of other things made in whole or in part from wood.

For producers and consumers in the South, timber output from southern forests has important implications for local, State, and regional economies. Because the South is a major producer of timber products, changes in its timber output have implications for the national economy as well.

Southern forests are valuable for many purposes. For example, they provide habitat for wildlife, produce forage for grazing animals, protect watersheds, and provide sites for outdoor recreation. Of all the benefits associated with forests, the production of timber is usually considered the most important in economic terms.

Timberland Area Location

Location by Region and State

The South has over 182 million acres of timberland, covering 55 percent of the total land area from the Atlantic coast to the eastern sections of Texas and Oklahoma. Timberland is the predominant land use, encompassing 2 to 3 out of every 5 acres in all of the Southern States including eastern Texas and Oklahoma.

Comparison With Cropland and Pasture

Southwide, there are more acres in timberland than in cropland and pasture combined (app. table 1.1). The 85 million acres of timberland in the Southeast represent 58 percent of the region's land area and more than twice the area of cropland and pasture. In the South Central region, including eastern forested parts of Texas and Oklahoma, there are 65 million acres of cropland and pasture and 97 million acres of timberland. Timberland represents 53 percent of that region's total land area.

Major Forest Management Types

The South's timberland is composed of a diversity of forest management types (fig. 1.1; Eyre 1980, USDA Forest Service 1982). Approximately one-third of the area is covered by pine types—41 million acres in natural pine stands and another 21 million acres in planted pine. Loblolly pine is by far the most abundant species. It occurs in natural stands in most sections of the Coastal Plain and Piedmont, where it has frequently seeded in on idle cropland and pasture. Loblolly pine has also been extensively planted throughout this area.

Shortleaf pine, a common associate of loblolly, becomes an increasingly important component of stands at higher elevations, especially in the Cumberland plateau, the southern Appalachians, and the Ouachita Mountains of western Arkansas and southeastern Oklahoma.

Longleaf pine was once the predominant species on the lower Coastal Plain. It was particularly well adapted for surviving frequent wildfires. Advances in fire control diminished the importance of this competitive advantage. Intensive logging, land clearing, and the establishment of loblolly and slash pine plantations have greatly reduced the area of longleaf pine over the years. The longleaf–slash pine association is now a dominant forest type primarily in southeastern Georgia and northern Florida.

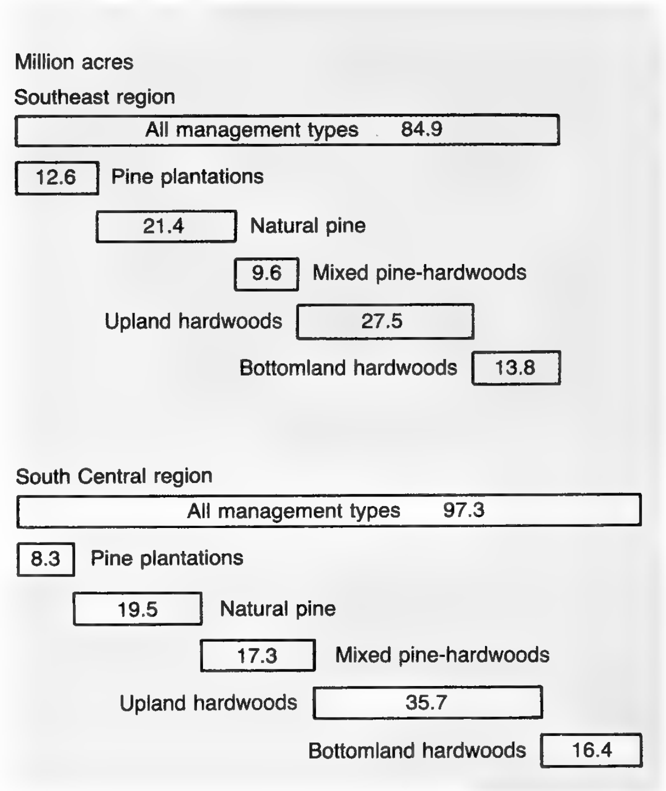


Figure 1.1—Area of timberland in the South, by region and forest management type, 1985

The Southeast region has 34 million acres in planted and natural pine forest types, 6 million acres more than the South Central region. Georgia and Florida, in particular, have high concentrations of pine plantations, and all States in the region except Virginia have over one-fourth of their timberland area in natural pine types.

Across much of the South, pine stands represent a transitional stage in natural succession to hardwood forest types. Mixed pine–hardwood stands occupy 27 million acres, or 15 percent of the timberland in the South. Typically, these stands are 50 percent or more oak and 25 to 50 percent pine. Common associations include upland oak–shortleaf pine on dry sites in the foothills and plateaus, mixed hardwood–loblolly pine on moist sites, and scrub oak–longleaf pine in the sandhills of the Carolinas, Georgia, and Florida.

Mixed pine–hardwood forest types tend to be larger component of the forest resource in the South Central region than in the Southeast. Close to two-thirds of the

mixed pine–hardwood acreage in the South is found in the South Central region. This forest type covers approximately one-fifth of the timberland in the States of Alabama, Mississippi, Arkansas, and Texas.

Hardwood forest types occupy over half the timberland area in the South, 93 million acres. These forest types are especially important for wildlife habitat. Two-thirds of this area is classified as upland hardwoods and one-third as bottomland hardwoods. A typical upland hardwood association includes oaks and hickories, with gum, yellow-poplar, elm, and maple. Although it occurs throughout most of the South, the oak–hickory association predominates in highland areas, especially the southern Appalachians and Ozark–Ouachita Mountains. High-quality sites in these regions, such as coves and moist flats, support stands of commercially valuable species of red and white oaks and yellow-poplar.

Upland hardwoods cover about a third of the timberland in both the Southeast and the South Central regions. Upland hardwoods constitute over half of the timberland in Tennessee, Virginia, and Oklahoma, and over a third in Alabama, North Carolina, and Arkansas.

Bottomland hardwoods are found on the alluvial floodplains of the Mississippi and other major rivers in the South. Oak–gum–cypress is the typical association on these sites, with such species as willow, water, laurel, swamp chestnut, and cherrybark oaks; water tupelo; blackgum and sweetgum; and baldcypress. There are 30 million acres of bottomland hardwoods in the South, about 17 percent of the timberland. Over half of these bottomland forests are located in the States of Louisiana, Florida, Georgia, and Mississippi.

Ownership Characteristics

Private Ownerships—Ninety percent of the timberland in the South is privately owned (fig. 1.2). Forest industries hold 42 million acres, slightly less than a fourth of the total area. This category includes companies or individuals that operate primary wood-using plants and either own or hold a long-term lease (leased for at least one rotation) on timberland. Forest industries own substantial acreages in all Southern States, but they own a proportionately larger share of the timberland in Florida and Georgia in the Southeast region and Arkansas, Louisiana, and Texas in the South Central region.

Two-thirds of the pine plantations in the South are found on forest industry lands. In the Southeast region, over 40 percent of the 19 million acres owned by forest industry are in planted pine. Bottomland hardwoods constitute another 20 percent. In the South Central region, natural pine types and pine plantations each represent about one-fifth of the 24 million acres of industry holdings. Mixed pine–hardwood and upland hardwoods cover a larger share of industry holdings here than in the Southeast region.

Approximately 122 million acres of timberland are owned by other private individuals or organizations. The "other private" category is extremely diverse and includes farmers, all other individuals, and corporations that do not also run wood-processing plants. Corporate owners include a variety of organizations holding timberland property as an investment, recreational area, or for other purposes, such as utility companies, railroads, realty firms, hunting clubs, insurance companies, and banks.

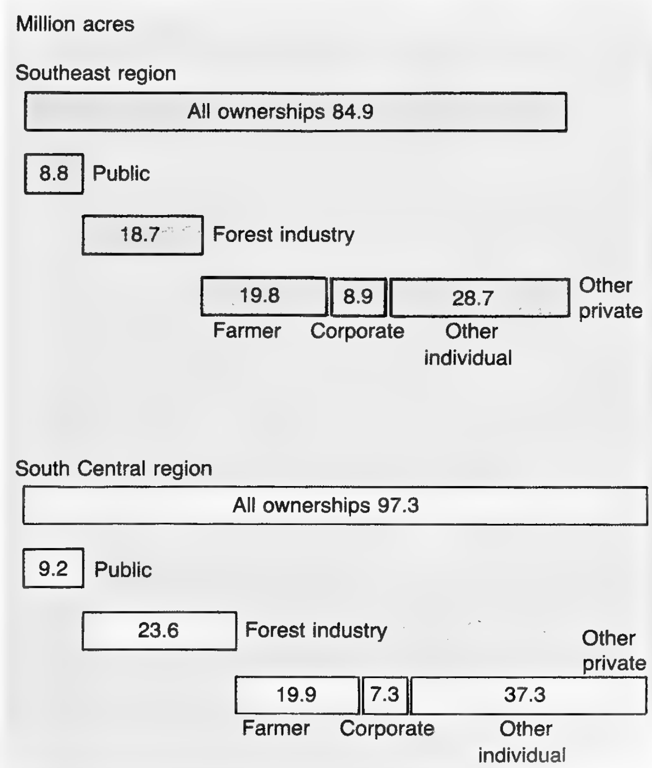


Figure 1.2—Area of timberland in the South, by region and forest ownership, 1985

Among other private owners, farmers own 40 million acres of timberland; corporate owners, 16 million acres; and other private individuals, 66 million acres. These acreages represent approximately one-fourth, one-tenth, and one-third, respectively, of all the timberland in the South. Ownership of timberland by individuals operating farms tends to be concentrated in North Carolina, Georgia, and Virginia in the Southeast region and Alabama, Mississippi, and Tennessee in the South Central region. A third of all the corporate-owned timberland is found in Florida and Louisiana. The predominant forest management type on timberland owned by other private owners is upland hardwoods. Bottomland hardwoods, however, represent a relatively large share of the timberland held by corporate owners.

Many of the private ownerships in the South represent small individual holdings. According to a 1978 survey of private ownerships in the South (Birch and others 1982), 92 percent of the ownership units were less than 100 acres. These small landholdings, accounted for only a fifth of the timberland area, however. Ownerships in the West Gulf (Arkansas, Louisiana, Texas, and Oklahoma) and the East Gulf (Georgia, Florida), where industry or corporate tracts are more common, tended to be larger than in the South Atlantic (Virginia, North Carolina, and South Carolina) and Central Gulf States (Tennessee, Alabama, and Mississippi), where there were higher concentrations of farm ownerships. Over half of the timberland in the West Gulf and East Gulf was in units larger than 1,000 acres, whereas only a third of the timberland in the South Atlantic and Central Gulf was in units this large.

Public Ownerships—Only 10 percent of the timberland in the South is publicly owned. These lands include the national forests, State forests and wildlife refuges, and other Federal, State, county, or municipal lands. National forests occupy 10.8 million acres, about 60 percent of the publicly owned land. Over half of the national forest timberland is located in Arkansas, Virginia, Mississippi, and North Carolina. In the Southeast region, national forest lands consist primarily of upland hardwood forest types in the Appalachian Mountains. Natural pine is the predominant forest type on national forest lands in the South Central region, although upland hardwoods and mixed pine–hardwoods also cover large areas.

Southwide, over 7 million acres of timberland are owned by other public entities. These lands tend to be natural pine or upland hardwoods in the Southeast. In the South Central region, large areas of bottomland hardwoods as well as upland hardwoods are in these other public ownerships.

Estimates of the Volume and Value of Roundwood Timber Products

The timber harvested from the timberland of the South is processed initially as logs, bolts, and other roundwood products. Most roundwood production comes from growing stock on timberland, although this supply is supplemented by the removal of dead, rough, rotten, and small trees, stumps, tops, and limbs, and trees from fencerows, urban areas, and other nontimberland sources. In 1984, an estimated 7.5 billion cubic feet of roundwood timber products were harvested in the South. Over 5 billion cubic feet of this volume came from softwood species, primarily southern pine, and close to 2.5 billion cubic feet came from a variety of hardwood species (app. table 1.2).

The value of standing timber or the trees from which these products were cut was over $3 billion, $2.7 billion for softwoods and $400 million for hardwoods (app. table 1.3). This amount, the stumpage value, represents the value that landowners received for the sale of their timber. When the value added from harvesting the timber and transporting it to rail sidings, concentration yards, or other local points of delivery is included, the value of roundwood timber output in the South exceeded $6 billion in 1984. Delivered values were approximately $4.5 billion for softwood products and $1.6 billion for hardwood products (app. table 1.4).

The value at local points of delivery of the roundwood—sawlogs, veneer logs, pulpwood, fuelwood, poles, piling, fence posts and other round products—produced in the South in 1984 was $6.1 billion.

Relative Importance of Products

The total roundwood harvest in the South represents a diversity of products for both industrial and consumer use. Trees of sufficient diameter to be cut into lumber are harvested and used mostly as sawlogs. Smaller and lower grade trees are the primary source of the pulpwood that pulp, paper, and paperboard mills process into wood fiber. Together, sawlogs and pulpwood accounted for 80 percent of total roundwood production in 1984.

For both softwoods and hardwoods, more timber is harvested for pulpwood than for any other product (fig. 1.3). The South produced approximately 2.2 billion cubic feet of softwood pulpwood and 1 billion cubic feet of hardwood pulpwood in 1984, representing 42 percent of total roundwood production. Sawlogs constituted 37 percent of the roundwood harvest and included 2 billion cubic feet of softwoods and 760 million cubic feet of hardwoods.

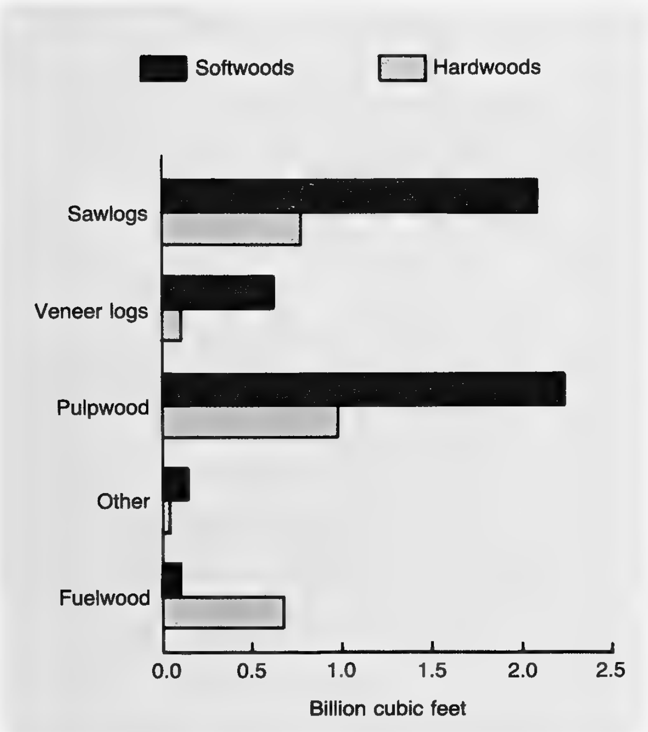


Figure 1.3—Volume of roundwood output in the South by product and species group, 1984

Average per-unit prices for sawlogs, however, run nearly 70 percent higher than pulpwood at local points of delivery and over three times the stumpage price for pulpwood. As the higher valued product, sawlogs claimed the larger share of the value of roundwood output. Sawlogs accounted for 44 percent of the delivered value for all roundwood products and an even larger proportion of the stumpage value. At local points of delivery, softwood sawlogs had an estimated value of $2.1 billion and hardwood sawlogs, $600 million. The corresponding stumpage values were $1.5 billion for softwood sawlogs and $225 million for hardwood sawlogs. Pulpwood production was valued at $1.4 billion for softwoods and $425 million for hardwoods at local delivery points, and $540 million for softwoods and $56 million for hardwoods as standing timber.

Veneer logs have an even higher per-unit value than sawlogs. Larger, higher quality logs and bolts are needed to produce sheets of veneer for use in furniture, cabinets, and plywood. Veneer logs constituted only 9 percent of the volume but approximately 19 percent of the stumpage value and 13 percent of the delivered value of roundwood output in the South in 1984. This production consisted of 610 million cubic feet of softwoods and 60 million cubic feet of hardwoods, with estimated delivered values of $750 million and $70 million, respectively.

Other industrial products include poles and piling (almost exclusively from softwood timber) and fenceposts, cooperage logs and bolts, mine timbers, shingle bolts, bolts used for handles, wood turnings, panel products, and a variety of other items, and chemical wood. Some 110 million cubic feet of softwoods and 17 million cubic feet of hardwoods were harvested for other industrial products in 1984. Although important locally and for specific needs, these products accounted for less than 2 percent of total roundwood production. Collectively, they added $160 million to the total delivered value for all products, and most of this amount was contributed by poles and piling.

Fuelwood for industrial and residential use, another major product from southern timberlands, increased dramatically in importance during recent periods when prices for mineral fuels rose rapidly. In 1984, an estimated 10 percent of total roundwood production in the South went for fuelwood. This amount included 55 million cubic feet of softwoods and 680 million cubic feet of hardwoods. These quantities represented over one-fourth of the hardwood harvest but only 1 percent of the softwood harvest.

Most roundwood fuelwood is used for residential heating because industries generally rely on wood plant byproducts rather than roundwood for fuel. Unlike industrial products, a substantial amount of fuelwood is self-cut by households and comes from nongrowing stock sources that do not otherwise produce industrial timber (Skog and Watterson 1983, Rudis 1986). In addition, the market for fuelwood is extremely diversified. Prices vary widely, depending upon the vendor, species mix, seasoning, time of year, quantity purchased, availability of self-cut wood, point of delivery, and numerous other factors.

Fuelwood is an important use of hardwoods, but softwoods dominate the market for industrial roundwood in the South. Southern pines supplied twice the volume of pulpwood and three times the volume of sawlogs and veneer logs compared to hardwood species.

In 1984, softwood industrial products had a stumpage value of $2.7 billion and a value at local delivery points of $4.4 billion. These amounts constituted 90 percent of the stumpage value and 80 percent of the delivered value of all industrial roundwood output in the South in that year.

The predominance of softwoods in the value of industrial roundwood reflects not only the larger quantities of softwoods harvested but also the higher proportion of the hardwood harvest that goes into lower valued products such as pulpwood. Of hardwood industrial roundwood, 54 percent was classified as pulpwood in 1984, compared with 44 percent for softwoods. Prices for hardwood roundwood products also tend in general to be lower than the same products from softwoods. Per-unit delivered prices for pine sawlogs, veneer logs, and pulpwood often run 40 percent higher than corresponding prices for hardwoods, and the price differential for standing timber is substantially greater (see app. tables 2.33–2.35). It should be noted, however, that the hardwood resource in the South is extremely diverse. Prices for scarce or high-quality hardwoods may be several times the average prices for mixed hardwood species of woods-run quality.

Relative Importance of Regions and States

In general, roundwood output from individual regions and States reflects the distribution of timberland and forest management types across the South. In 1984, States in the Southeast region produced 3.6 billion cubic feet of industrial products and fuelwood, about 48 percent of the Southwide total. These products had a stumpage value of $1.4 billion and a value at local points of delivery of $2.9 billion. The South Central region accounted for 3.9 billion cubic feet of output, 52 percent of total production, with a value of $1.6 billion as standing timber and $3.2 billion delivered.

Although softwoods dominated industrial production in both regions, the South Central region derived a slightly higher proportion of its total output from hardwood species than did the Southeast region. In particular, the South Central region produced 600 million cubic feet of hardwood pulpwood, over 60 percent of the South's total for this product. The Southeast region led in the production of softwood pulpwood with 1.2 billion cubic feet, compared with 1.1 billion cubic feet for the South Central region. Sawlog output followed a similar pattern. Hardwood sawlogs from the South Central region totalled 430 million cubic feet, compared with 330 million cubic feet from the Southeast region. Both regions harvested over a billion cubic feet of softwood sawlogs, with marginally higher output in the South Central region. For hardwood veneer logs, the Southeast region was the primary producer; for pine veneer logs, the South Central region.

Softwood sawlogs and veneer logs together were the source of about two-thirds of the returns to landowners for roundwood products in both the Southeast and South Central regions in 1984. In the Southeast region, this stumpage value amounted to $760 million for softwood sawlogs and another $170 million for softwood veneer logs. The South Central region had a higher proportion of stumpage values in veneer logs, with $380 million attributed to veneer logs and $750 million to sawlogs. Hardwood sawlogs and veneer logs added to stumpage values another $110 million in the Southeast region and $150 million in the South Central region.

Pulpwood represented 23 percent of the total stumpage value in the Southeast region and 16 percent in the South Central region, but it held a much larger share of the value of roundwood products after harvesting and transportation to local delivery points (fig. 1.4). Delivered values for pulpwood in the Southeast region were $950 million (32 percent of the total value of production) and in the South Central region, $910 million (29 percent of total output). Softwoods accounted for 81 percent of this value in the Southeast region and 73 percent in the South Central region.

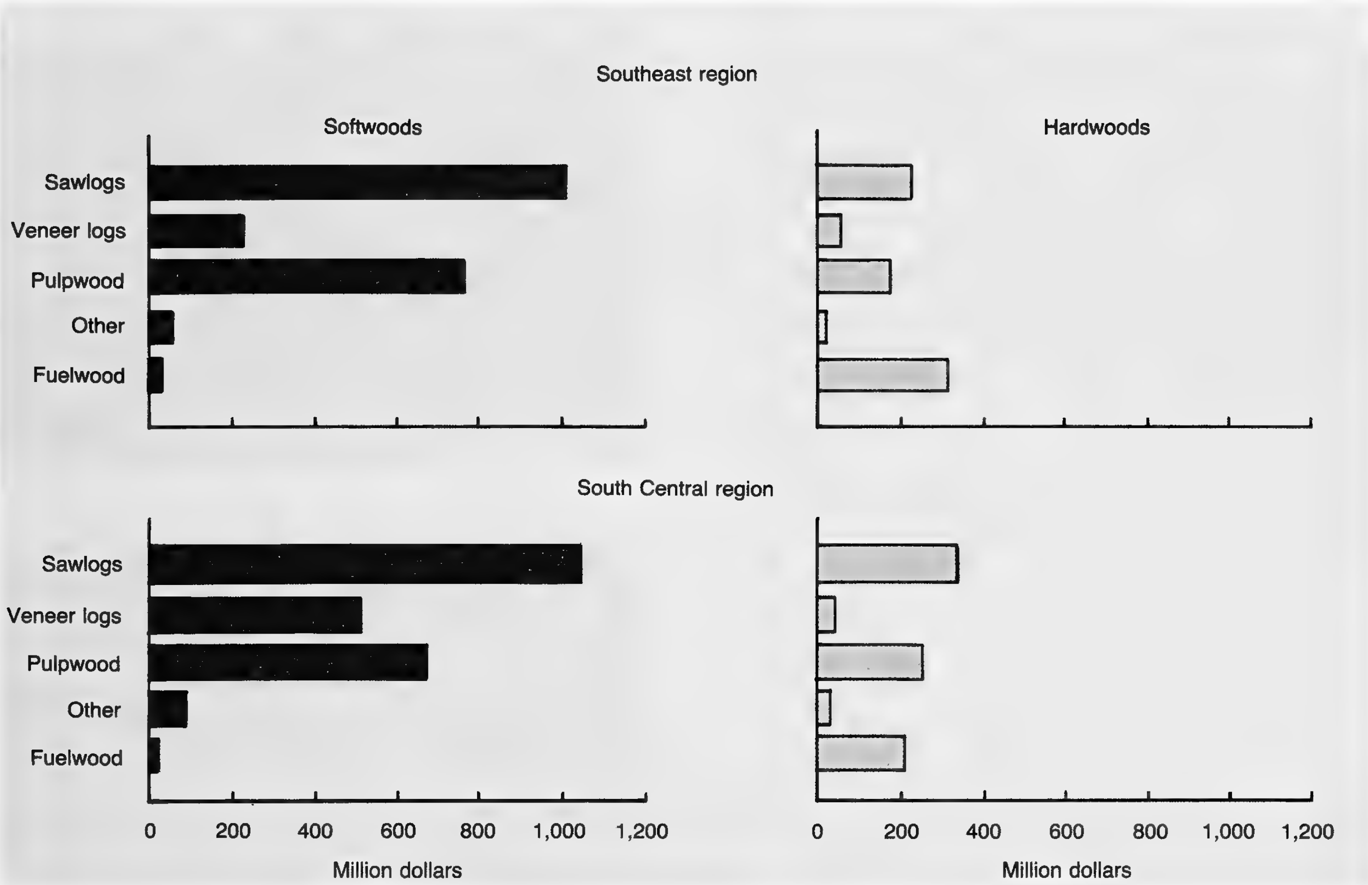


Figure 1.4—Value at local points of delivery of roundwood timber products in the South, by region and species group, 1984

Among individual States, the leading producers of roundwood in 1984 were Georgia, Alabama, Mississippi, and North Carolina. Together, these four States accounted for half the total roundwood output in the South. The estimated value of these products at local points of delivery was over $1 billion in Georgia, $740 million in Alabama, $590 million in Mississippi, and $570 million in North Carolina. For Texas, Louisiana, and Virginia also, the value of roundwood products exceeded a half billion dollars.

Georgia alone produced some 470 million cubic feet of softwood pulpwood and 450 million cubic feet of softwood sawlogs, about a fifth of the South's total output of these products. Alabama and Mississippi each had a combined softwood sawlog and veneer log harvest of over 300 million cubic feet. Texas, Louisiana, Arkansas, North Carolina, and South Carolina each produced more than 200 million cubic feet. Production figures for Texas and Louisiana included relatively high proportions of veneer logs. Behind Georgia, the leading producers of softwood pulpwood were Alabama, Florida, and Louisiana.

For hardwood roundwood, Virginia, North Carolina, and Alabama had the highest output, producing about 350 million cubic feet each. Alabama produced over 215 million cubic feet of hardwood pulpwood, one-fifth of the South's total. Among the other States, Tennessee was a major source of hardwood sawlogs, Georgia of hardwood veneer, and Mississippi of hardwood pulpwood.

Value of Timber Products Compared With That of Agricultural Crops

The importance of timberland and timber products in the South's economy is evident when the value of roundwood timber produced is compared with the value of other crops from agricultural lands. The $6.1 billion of roundwood timber products output in 1984 was twice the value of soybean or cotton production and three times the value of tobacco, wheat, or corn crops in the South in that year—all values at local points of delivery (fig. 1.5). With a few exceptions, the timber harvest exceeded the value of these crops for individual States as well. Southwide, there was $1 of roundwood timber output for every $3 dollars of other crop production (app. table 1.5).

The timber harvested in 1984 ranked among the top three crops in terms of value of production in all 12 Southern States (app. table 1.6 and fig. 1.6). It was first in value in six States—Virginia, South Carolina, Georgia, Alabama, Mississippi, and Louisiana. In Alabama, roundwood timber products almost equaled in value the total for all other crops. In the other five States, the value of roundwood products was equivalent to two-fifths to three-fifths of other crop values. Timber ranked second behind some of the largest individual State crops in the South—wheat in Oklahoma, cotton in Texas, and tobacco in North Carolina. It ranked third in Florida, exceeded only by fruit and nut production and the harvest of commercial vegetables. Soybeans and rice in Arkansas and soybeans and tobacco in Tennessee generated the highest crop production values in those States, but roundwood timber was a close third.

The value of roundwood timber products produced in the South in 1984 was twice that of the soybeans or cotton produced, and three times that of tobacco, wheat, or corn. There was $1 worth of timber produced for every $3 worth of other crops produced.

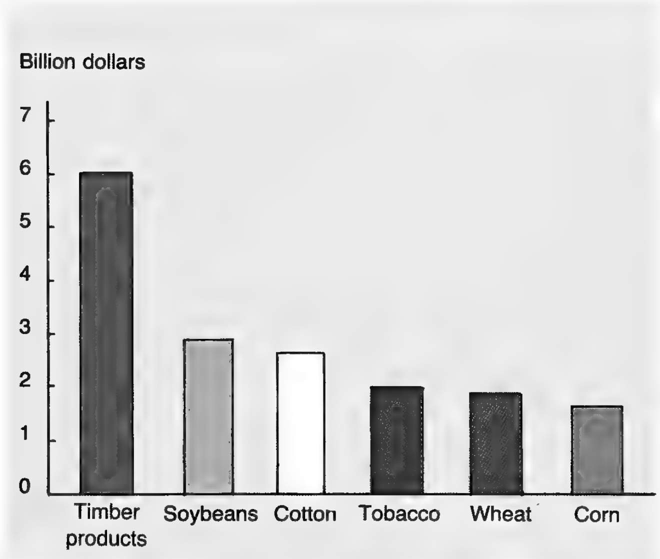


Figure 1.5—Value at local points of delivery of roundwood timber products and the highest valued agricultural crops in the South, 1984

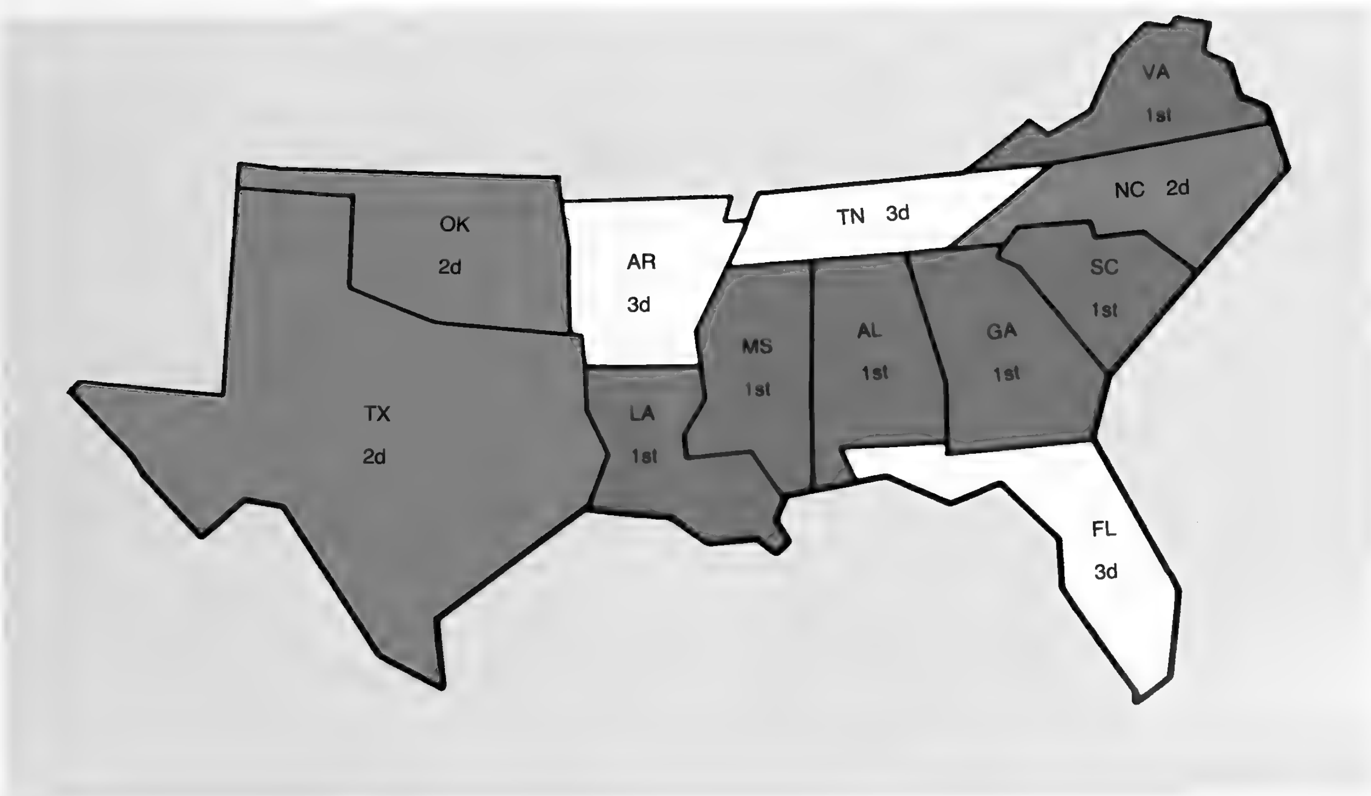


Figure 1.6—Ranking of the value of roundwood timber products with major agricultural crops in the South, 1984

Contribution of Forest Industries to the Southern Economy

Scope of Forest Industry Manufacturing

The value of roundwood timber products is one measure of timber's contribution to the economy of the South. Payments to landowners for stumpage and to operators for harvesting and hauling roundwood to processing sites represent income and jobs directly attributable to the forest resource.

Timber supports income and employment in many other sectors of the economy as well. Roundwood products provide raw material for a diversified array of manufacturing industries. Some industries, such as sawmills and paper mills, process roundwood directly into lumber, newsprint, or other marketable commodities. Other industries purchase these primary wood products to manufacture more highly finished goods, such as millwork, cabinets, furniture, prefabricated buildings, pallets, containers, boxes, bags, and high-grade paper products. Timber is also essential for producers of gum and wood chemicals and wood-preserving firms. Income and employment in all of these industries depend on the timber resource.

The 1982 Census of Manufactures published by the U.S. Bureau of the Census—the most recent source of comprehensive data—provides some measures of the contribution of these forest industries to the economy of the South in terms of the number of timber-based manufacturing establishments, the value of their shipments and the value added to their products in the manufacturing process, and the employment and wages and salaries they provide. "Forest industries," as the term is used here, encompasses all or part of four main industry groups under the Standard Industrial Classification system used by the Bureau of the Census in collecting data on manufacturing: lumber and wood products, furniture and fixtures, paper and allied products, and gum and wood chemicals. The Census data represent the total activity of forest industry establishments, even though timber is only one of the raw materials they use. These data do not measure the economic importance of forest industries as producers and consumers of goods and services for nonmanufacturing sectors of the economy, including wholesale and retail trade, construction, transportation, communications, energy, finance and banking; nor do they measure the additional production induced throughout the economy by the income generated from jobs in forest industries.

Contributions to the Economy Southwide

In 1982 there were nearly 17,000 establishments engaged in some aspect of timber-based manufacturing in the South. This number represents nearly one out of every five manufacturing establishments. Forest industries employed 557,000 people and paid $8.5 billion annually in wages and salaries. Their product shipments were valued at over $49 billion. The value added by manufacture amounted to nearly $20 billion. Value added is a net measure of an industry's contribution to production in the economy in that the value of the materials received from other firms and used in the manufacturing process is subtracted from the value of the products shipped.

In addition to providing income and employment in timber-based manufacturing, forest industries support jobs in those sectors of the economy that supply forest product firms with the services and materials they need for production, such as machinery, chemicals, and energy. Similarly, wages and salaries paid to employees of forest product firms and associated industries are spent in part to buy groceries, clothing, household furnishings, and other goods and services in the community, thereby stimulating income and employment in those sectors. Input–output models for national, regional, State, or local economies are often used to generate measures of this interdependence among sectors of an economy. Multipliers from these models indicate the impact of a one-unit increase (or decrease) in output, employment, or income (wages and salaries) in one sector on the sectors from which it purchases services and materials and on all sectors throughout the economy as household income and consumption increases.

State-level input–output models developed in recent years for States in the South show a range of multipliers for forest industries, reflecting the many differences among individual State economies (app. table 1.7). The median value for State-level income multipliers in both lumber and wood products manufacturing and in pulp and paper manufacturing is approximately 2.4.[1] These multipliers indicate that a $1 increase in wages and salaries in the lumber and wood products sector or the pulp and paper products sector would result in an expansion of wages and salaries for all sectors Statewide of $2.40. Median values of employment multipliers from individual State models in the South are around

[1] The multipliers cited for income and employment are Type II multipliers, reflecting direct, indirect, and induced effects, compiled in Flick (1986 unpubl.).

2.3 for lumber and wood products and 2.6 for pulp and paper products. Regional multipliers for forest industry income and employment are probably higher, since a greater degree of interdependence among sectors exists within a regional economy than within a State.

Although the contributions cannot be measured precisely, it is clear that forest industries hold a very important place in the southern economy through the people they employ, the income they generate, and the value of the products they make.

Comparison With Other Manufacturing

In relationship to all manufacturing in the South, forest industries in 1982 employed one out of every nine workers, paid $1 out of every $10 in wages and salaries, and produced $1 out of every $11 of value added to the economy by manufacturing (app. table 1.8). Aggregate employment and income from forest industries across the South exceeded those in other major manufacturing industries, such as textiles, apparel, processed food, chemicals, electric and electronic equipment, nonelectrical machinery, and transportation equipment including ships, boats, and aircraft (fig. 1.7).

In the South, forest industries employed one out of every nine workers, paid $1 out of every $10 in wages and salaries, and produced $1 out of every $11 of value added to the economy by manufacturing in 1982.

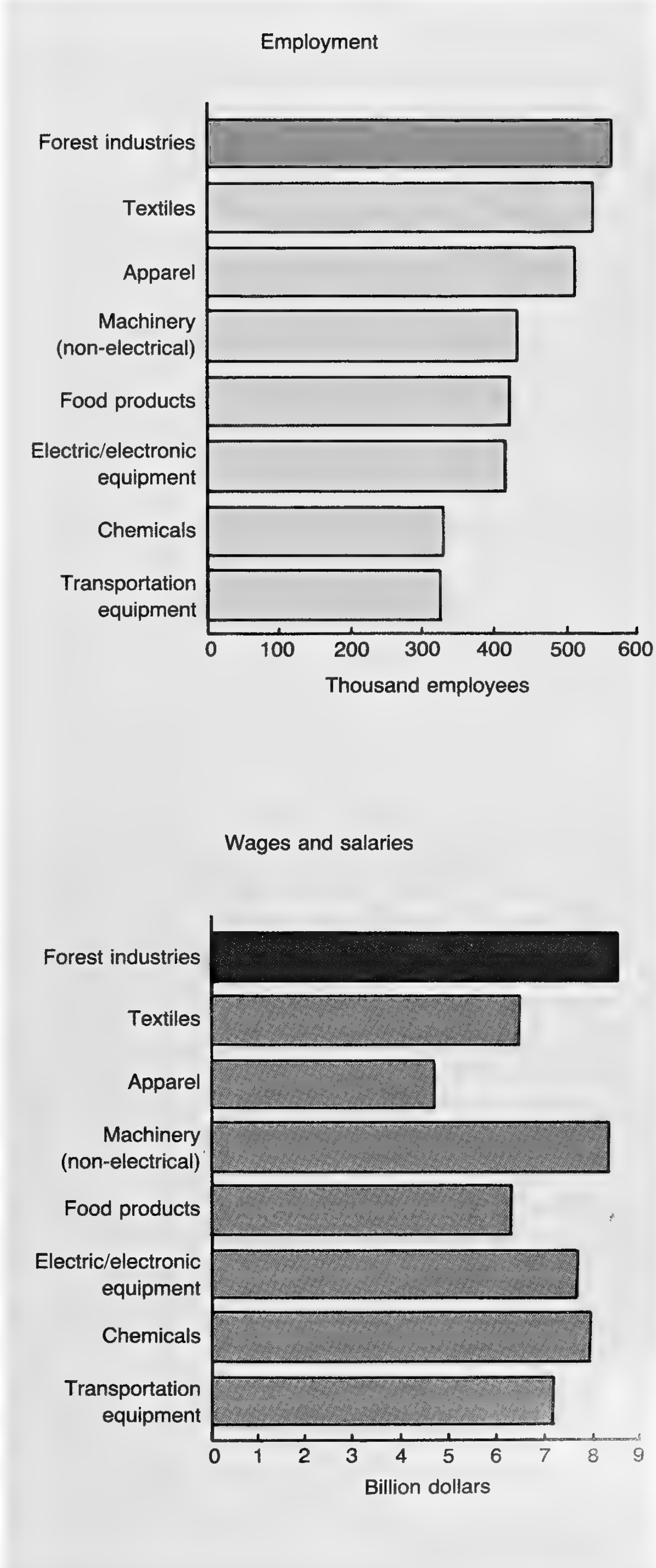


Figure 1.7—Employment and wages and salaries in manufacturing in the South, by industry, 1982

Although the industrial base of individual States varies across the South, forest industries represent a leading sector in nearly all States. In 1982, forest industries ranked fourth or higher in importance among major industry groups for all States in the South except Florida, Texas, and Oklahoma (fig. 1.8).

Forest industries were the leading manufacturing industry in Mississippi and Arkansas, providing approximately 18 percent of all jobs and wages and salaries in those States. In Alabama, the apparel industry employed more people, but forest industries collectively had the highest payroll among manufacturing groups and generated $1 out of every $5 of value added by manufacturing in the State's economy.

In Georgia and North Carolina, textile mills were the leading manufacturing industry. Forest industries, however, outranked all other nontextile manufacturing in jobs, income, and value added, except for employment in apparel manufacturing in Georgia and the value added by tobacco products in North Carolina.

In Virginia and Tennessee, chemical manufacturing is a major industry. In Virginia, however, forest industries were still the leading employer, and, in Tennessee as well as Virginia, only the chemical industry paid out more than forest industries in wages and salaries.

Forest industries were fourth in importance among the manufacturing sectors in the States of Louisiana and South Carolina. Louisiana is a major producer of transportation equipment, petroleum products, chemicals, and food products. South Carolina has large textile, apparel, chemical, and nonelectrical machinery industries. Forest industries, however, represented over 10 percent of all manufacturing employment and payrolls in Louisiana and approximately 8 percent in South Carolina in 1982.

Even in those States where timber represents a relatively smaller share of the total land area and manufacturing base, forest industries make a significant contribution to the economy, especially for those sections of a State where timberland is concentrated. In 1982, forest industries in Texas

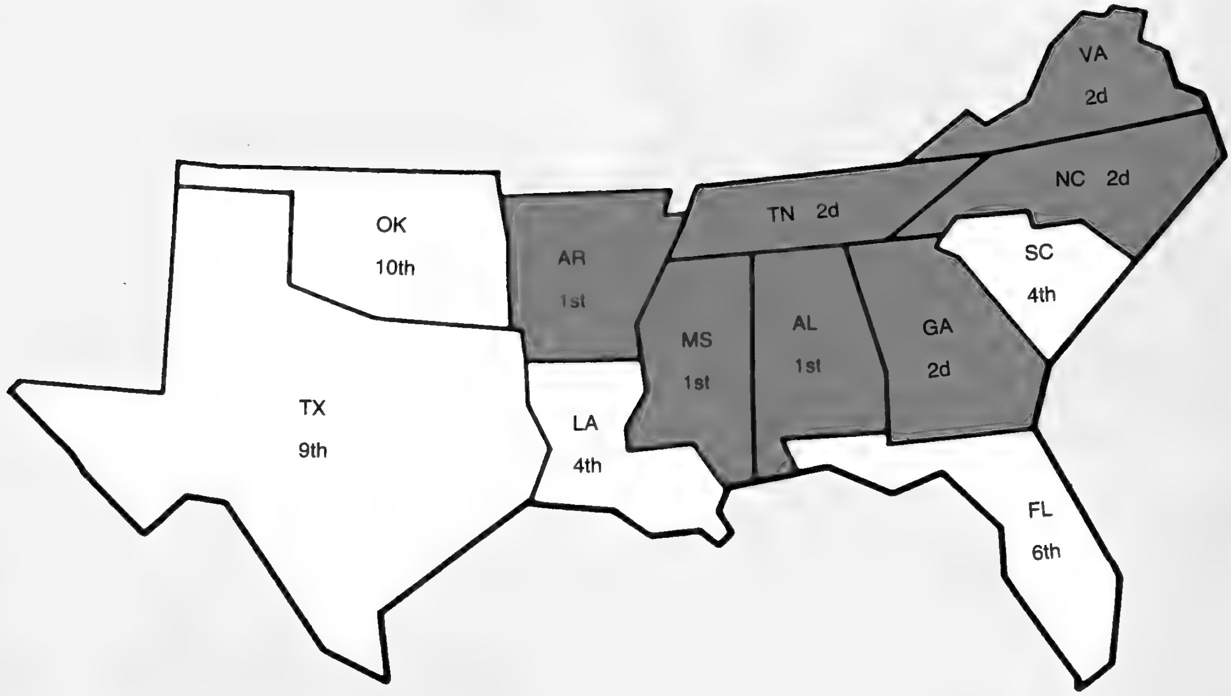


Figure 1.8—Ranking of forest industry wages and salaries with other manufacturing industries in the South, 1982

generated close to a billion dollars annually in wages and salaries, the third highest total for any State in the South.

Timber-based manufacturing in Florida and Oklahoma together added another three-quarters of a billion dollars to State and regional incomes.

Relative Importance of Forest Industries by Type

The great diversity of forest products manufactured in the South makes it difficult to categorize forest industries by type. It is often useful, however, to group forest industries into those that produce products made of solid wood and those that use primarily wood fibers. This basic division highlights differences between industries in the size and quality of the timber required and the degree of processing involved. Manufacturing of wood furniture is another industry that has somewhat specialized raw material needs, production processes, and markets.

The lumber and solid wood products industry includes loggers, sawmills, and planing mills that produce the initial raw material as roundwood and process it directly into marketable goods, such as lumber, dimension stock, and flooring. It also includes manufacturers of other products from roundwood, such as plywood and veneer, goods manufactured from primary products such as millwork, nailed boxes, pallets, wood buildings, and mobile homes. This segment of the industry also includes processors of gums and wood chemicals, and wood-preserving firms.

Wood furniture manufacturing includes all-wood furniture for household or office use, upholstered furniture on wood frames, shelving, partitions, and other wood fixtures.

The manufacture of wood fiber or pulp and paper products involves an initial stage of processing, where mills produce woodpulp and reconstitute it into paper, paperboard, building paper, or building board; and secondary stages in which this material is converted into a wide range of finished products, such as fine-grade papers, stationery, containers, bags, and boxes.

The relative importance of each of these sectors of forest industry in the South and within regions and States is shown in appendix table 1.9.

Over half of the 17,000 forest industry establishments in the South in 1982 were logging contractors, sawmills, or planing mills; two-thirds of this number were logging contractors. Manufacturers of other solid wood products, such as plywood, veneer, millwork, wood buildings, and containers, and wood-preserving firms, constituted another one-quarter of the establishments. Twelve percent of the forest industry establishments manufactured furniture or fixtures from wood. Converted paper and paperboard products accounted for 8 percent of the establishments. Pulp, paper, paperboard, and building paper and board mills represented only 1 percent of the total. These percentages reflect the character of different industries more than their importance in the South. Logging and sawmill operations, for example, tend to be smaller and more dispersed than pulp and paper manufacturing, which requires large-scale, capital-intensive plants.

In terms of employment, the lumber and wood products industry is the most important sector of the forest industries (fig. 1.9). In 1982, this sector had 233,000 workers, or 42 percent of the total employment in forest industry manufacturing in the South. The pulp and paper products industry accounted for 178,000 employees, 32 percent of the total. The wood furniture sector had 146,000 employees, 26 percent of total employment.

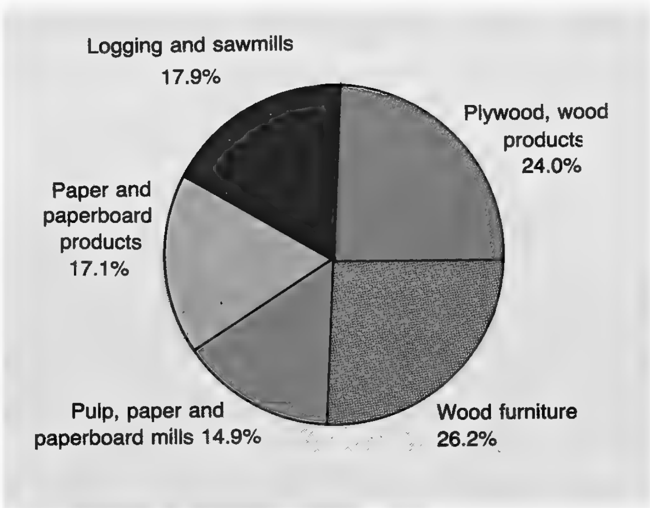


Figure 1.9—Distribution of employment among forest industry sectors in the South, 1982

Pulp and paper manufacturers, however, led the other forest industries in wages and salaries (fig. 1.10), as well as value of shipments and value added by manufacture. In 1982, they contributed nearly $4 billion in wages and salaries, $26.3 billion in shipments, and $10.8 billion in value added. These figures represented 46 percent of the Southwide total for wages and salaries, 53 percent of the shipments, and 54 percent of the value added in the forest industries. Over half of these amounts is attributable to production and initial processing of woodpulp at pulp, paper, and paperboard mills.

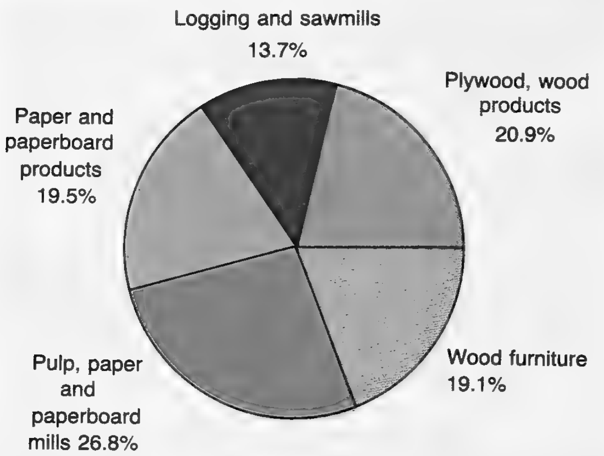


Figure 1.10—Distribution of wages and salaries among forest industry sectors in the South, 1982

The pulp and paper products industry is the source of nearly half of the wages and salaries and a little over half of the value of shipments and value added by manufacture in all the forest industries in the South.

Lumber and wood products and wood furniture accounted for 29 percent and 16 percent of the total value added, respectively. Of the $5.7 billion in value added from solid wood products, $1.4 billion came from sawmills and planing mills; $1.3 billion from millwork, softwood and hardwood plywood, and cabinets; $890 million from logging operations; $860 million from prefabricated wood buildings and mobile homes; $820 million from wood preserving, particleboard, and miscellaneous wood products; $250 million from boxes and pallets; and $140 million from gum and wood chemicals.

Value added by wood furniture in 1982 was $3.2 billion, which includes $1.6 billion from wood household furniture, $1.2 billion from upholstered furniture on wood frames, and $400 million from wood office furniture, shelving, partitions, and other fixtures.

Relative Importance of Forest Industries by Region and State

In 1982 the Southeast had approximately 9,000 establishments providing 304,000 jobs in the forest industries. The South Central region had 8,000 forest industry establishments employing 253,000 people. The profiles of forest industries within the Southeast and South Central regions are quite similar with the exception of wood furniture manufacturing, which is concentrated in the Southeast region. Approximately one worker out of every four in forest industries in the South was employed in furniture manufacturing. Seventy percent of this employment was in the Southeast region, 60 percent in North Carolina and Virginia alone.

The South Central region claimed a slightly larger share of employment, wages and salaries, and value added from logging and sawmills and from plywood, veneer, and other solid wood products. In addition, the total value of shipments and value added by manufacturing from pulp, paper, and paperboard mills is estimated to be about 25 percent higher than production from mills in the Southeast region.

For both regions, pulp, paper and paperboard mills led other forest industry sectors in value added to the economy in 1982. For every $100 of value added by forest products in the South Central region, $35 was attributable to the mill sector; $24 to converted paper and paperboard products; $18 to plywood, veneer, and other solid wood products; $13 to

logging and sawmills; and $10 to wood furniture and fixtures. In the Southeast region, the corresponding contributions were $27 from pulp, paper, and paperboard mills; $24 from converted paper and paperboard products; $22 from wood furniture and fixtures; $17 from plywood, veneer, and other solid wood products; and $11 from logging and sawmills.

Among individual States in the South, North Carolina employed the most people in the forest industries in 1982—122,000, or 22 percent of the Southwide total. North Carolina had the largest employment for furniture manufacturing and for logging contractors in the South. Texas and Georgia each accounted for 11 percent of total employment, with over 60,000 employees apiece. Georgia ranked first in manufacturing jobs in converted paper and paperboard products. Texas, as the leading producer in the South for millwork, kitchen cabinets, softwood plywood, mobile homes, and prefabricated wood buildings, headed employment in the plywood, veneer, and other solid wood products category. The leading State for employment in pulp, paper, and paperboard mills was Alabama. Collectively, forest industry wages and salaries in these four States totaled $4.4 billion, over 50 percent of the income derived from these industries Southwide. The value added by the manufacture of forest products in each State exceeded $2.0 billion.

Recent Trends for Forest Industries in the South

Forest industries have long been an important component of the South's economy, evolving with changes in the forest resource. The South's "first forest" supplied lumber, fuelwood, naval stores, and other products from colonial times into the second decade of the 20th century. Lumber production in the South peaked in the early 1900's and then gradually declined as lumber companies closed or moved west, having depleted supplies of old-growth timber and leaving extensive areas of cutover lands. In response to this situation, Federal, State, and private forestry programs were initiated to provide fire protection and encourage regeneration on timberlands. During the 1930's, the establishment of the South's "second forest" accelerated as millions of acres were planted by the Civilian Conservation Corps and regenerated naturally on cutover and idle cropland and pasture.

This second forest supported the development and growth of the pulp and paper industries in the South, following technological advances in sulfate pulping of southern pines. By providing a market for small trees, these new industries made plantations and other forest management practices economically viable and promoted regeneration of a "third forest" (Southern Forest Resource Analysis Committee 1969). This forest will be supplying timber for forest industries until the turn of the century.

The expansion of pulp and paper manufacturing over the past four decades has significantly changed the composition of the forest industry sector in the South. Manufacturers of lumber and wood products still employ more people than the pulp and paper products industry (app. table 1.10). Between the 1947 and 1982 Censuses of Manufactures, however, their total employment declined sharply, whereas employment in pulp and paper products manufacturing steadily increased to record levels (fig. 1.11). Since the mid-1950's, wages and salaries and value added in the pulp and paper products industry have surpassed those in lumber and wood products (fig. 1.12). Between 1947 and 1982, income generated and value added by pulp and paper products manufacturing in the South expanded by 360 percent in constant dollars (app. tables 1.11 and 1.12).

New products also emerged in the lumber and wood products industry during this period, most notably southern pine plywood in the 1960's. Manufacturing activity in lumber and wood products, which had been declining, began a new period of expansion in that decade, reaching record levels for wages and salaries and value added (in constant dollars) with peaks in housing demand in 1972 and 1977. Although the 1982 Census of Manufactures data reflect the general decline in manufacturing activity during the 1981–82 recession, estimates from the 1985 Annual Survey of Manufactures indicate increased activity in the lumber and wood products sector in the following years, with employment up 4 percent, wages and salaries up 9 percent, and value added up 24 percent between 1982 and 1985 (app. table 1.13). In the pulp and paper products industry, the 1985 estimates indicate a slight increase in total employment, a 9-percent increase in wages and salaries, and a 12-percent increase in value added Southwide.

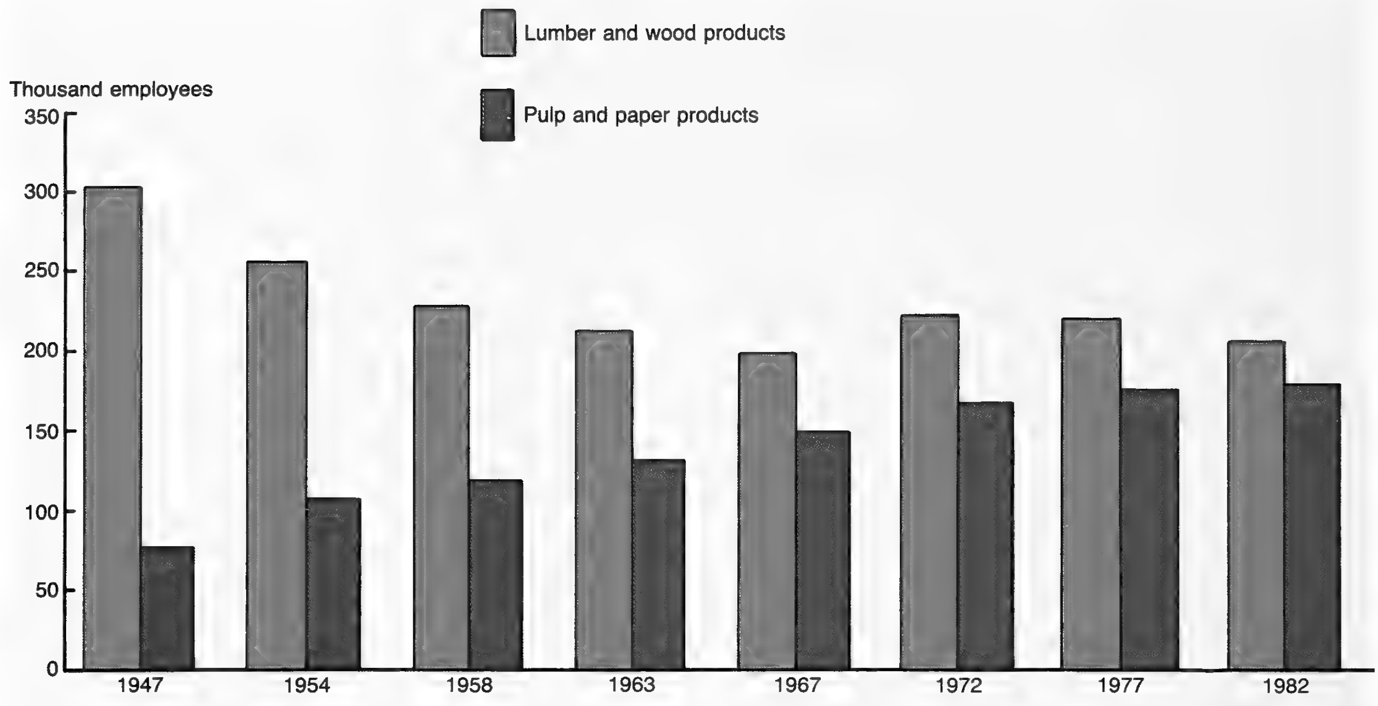


Figure 1.11—Employment in forest industries in the South, 1947-82

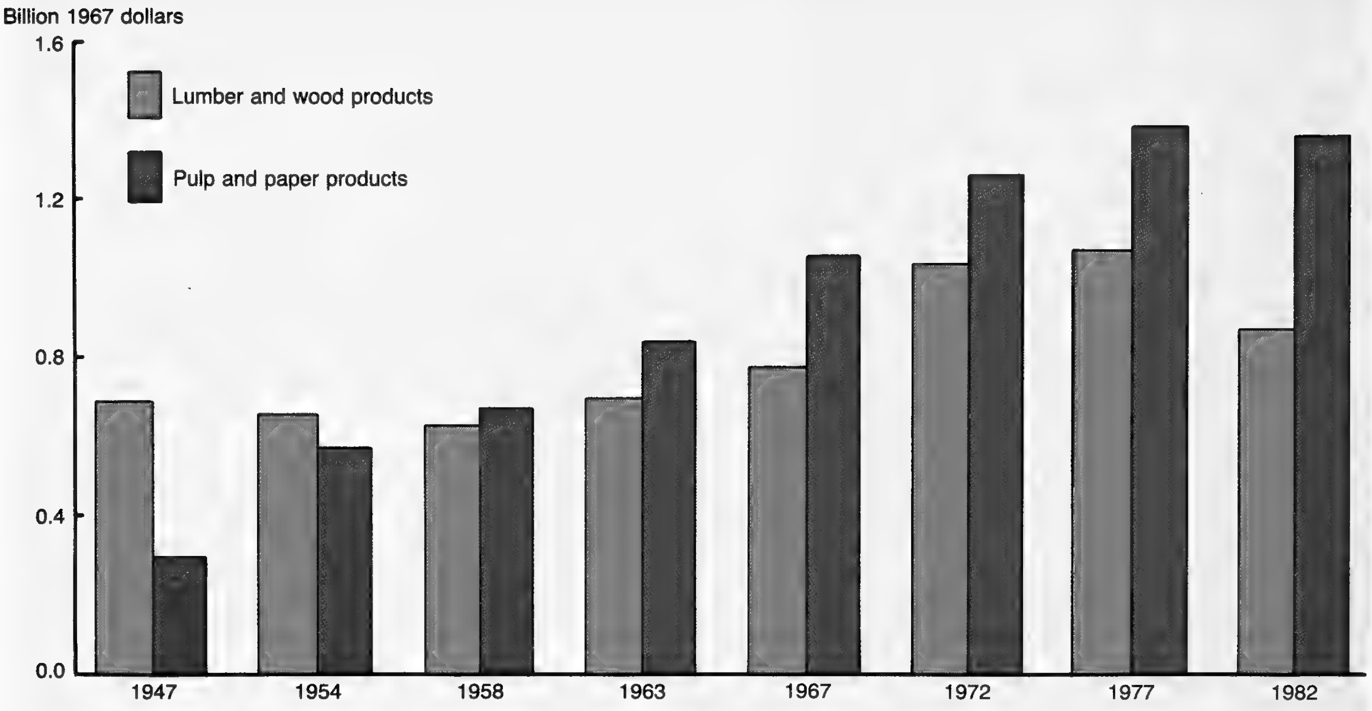


Figure 1.12—Wages and salaries in forest industries in the South, 1947-82

The growth of forest industry manufacturing in the South over the past 4 decades has relied primarily on the pine resource. Softwood timber removals nearly doubled between 1962 and 1984 (fig. 1.13), while the number of acres in pine plantations nearly tripled. Hardwood removals remained relatively constant until the late 1970's, when fuelwood demands increased sharply with the rise in oil prices and technological developments expanded the use of hardwoods for woodpulp and for structural panels, such as waferboard and oriented strand board.

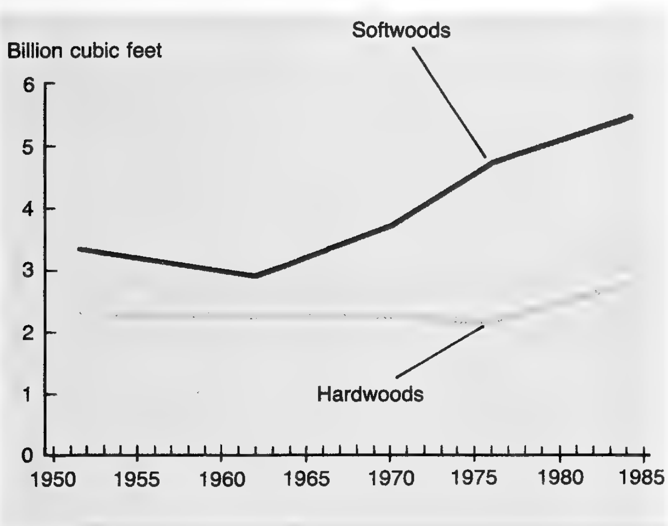


Figure 1.13—Timber removals in the South, by softwoods and hardwoods, 1952–84

The Importance of the South for Forest Industries Nationwide

The growth of new sectors of forest industry in the South has enhanced its position as a major producer of forest products on a national scale. The South leads the West, North Central, and Northeast in the value added from the manufacture of both solid wood and wood-fiber products as well as wood furniture. In 1982, the Southern States accounted for 57 percent of total employment in the manufacture of wood furniture and fixtures, 40 percent of employment in the manufacture of lumber and other solid wood products, and 29 percent of employment in pulp, paper, and paperboard manufacturing. Employment, wages and salaries, value of shipments, and value added by manufacture for all forest industries in the South represented approximately one-third of forest industry activities nationwide.

In summation, it is clear that forests and forest industries are of great importance to the economy and society of the South. It is also clear that they have been increasing in importance in recent decades. Material in the following chapter describes the longrun changes in the forest resource and the policies and programs—fire protection, technical and financial assistance, research, education, and management of private and public timberlands—that have brought the forests in the South to their present state of productivity.

Literature Cited

Birch, Thomas W.; Lewis, Douglas G.; Kaiser, H. Fred. 1982. The private forest-land owners of the United States. Resour. Bull. WO-1. Washington, DC: U.S. Department of Agriculture, Forest Service. 64 p.

Eyre, F.H., ed. 1980. Forest cover types of the United States and Canada. Washington, DC: Society of American Foresters. 148 p.

Rudis, Victor A. 1986. Domestic fuelwood use in Louisiana. In: Smith, Wayne H., ed. Biomass energy development: Proceedings, 3d annual southern biomass energy research conference; 1985 March 12–14; Gainesville, FL. New York: Plenum Press: 43–55.

Skog, Kenneth E.; Watterson, Irene A. 1983. Residential fuelwood use in the United States 1980–81. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. 55 p. + appendices.

Southern Forest Resource Analysis Committee. 1969. The South's third forest . . . how it can meet future demands. [Place of publication unknown]: Southern Forest Resource Analysis Committee. 111 p.

U.S. Department of Agriculture, Forest Service. 1982. Domestic timber resources (chapter 6). In: An analysis of the timber situation in the United States 1952–2030. For. Resour. Rep. 23. Washington, DC: U.S. Department of Agriculture, Forest Service: 116–145.

U.S. Department of Commerce, Bureau of the Census. 1985. Current industrial reports series: Lumber production and mill stocks MA24T(84)–1; Softwood plywood MA24H(84)–1; Hardwood plywood MA24F(84)–1; and Pulp, paper and board MA26A(84)–1. Washington, DC: U.S. Department of Commerce, Bureau of the Census.

U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, Bureau of the Census. 1982. 1980 National survey of fishing, hunting, and wildlife-associated recreation and State supplements. Washington, DC: U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, Bureau of the Census.

Literature Cited—Unpublished

Flick, Warren A. 1986. Regional aspects of the Southern Timber Study. Auburn University, Alabama. (Unpublished report submitted as part of a cooperative agreement with U.S. Department of Agriculture, Forest Service.) 18 p. [Available from Forest Inventory and Economics Research, USDA Forest Service, P.O. Box 96090, Washington, DC 20090-6090.]

U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, Bureau of the Census. Preliminary findings from the 1985 national survey of fishing, hunting, and wildlife-associated recreation. [Available from Forest Inventory and Economics Research, USDA Forest Service, P.O. Box 96090, Washington, DC 20090–6090.]

Chapter 2

The Changing Forest Resources and Forest Industries in the South

To the first settlers in the South, the forest was a great unending wilderness—it stretched from the sea to the plains of central Texas and Oklahoma. But these forests provided timber for homes, furniture, and fuel. They also provided a place for grazing livestock and habitat for game. The forests have served the people in the South long and well. And they do so today.

The Lessons of the Past

Most of chapter 2 has been abstracted from the following reports: "Changes in Forest Resources and Industries in the South" by Robert S. Maxwell; "Impacts of State Programs on Forest Resources and Industries in the South" by John C. Barber; "Impacts of the National Forests on the Forest Resources of the South" by A. P. Mustian and Sharon Young; "Impacts of Forest Industries on Forest Resources in the South" by Robert M. Nonnemacher; "Impact of Forestry Associations on Forest Productivity in the South" by J. Walter Myers, Jr.; "Impacts of Research on Forest Resources and Industries in the South" by H.R. Josephson; "Growth of Southern Higher Education Forestry Programs and Their Impact on the South's Timber Resources and Industries" by John Gray; "Taxes and the Southern Forest" by William C. Siegel and Clifford A. Hickman; "Southern Timber Prices: A Historical Perspective" by J. Michael Vasievich; and "Evaluation of the Effectiveness of Market Responses to Timber Scarcity Problems" by Frederick W. Cubbage and Richard W. Haynes.

From the above titles, all but the Siegel report are being published separately as appendices to this study. Copies are available from USDA Forest Service, Information and Publications Services, T-10210, 415 Postal Service Building, 701 Loyola Avenue, New Orleans, LA 70113.

Former Secretary of Defense Robert A. Lovett once observed, "Good judgement is usually the result of experience. And experience is frequently the result of bad judgement." Hopefully, society can learn from past experiences. That hope is of great importance in forestry because decisions have impacts on people's lives over long periods of time. The decisions and actions taken a generation or more ago have shaped the forest of today. In the same way, current decisions and actions will have important consequences decades from now. Historical study can provide insights on the policies and programs that have been effective in the past. Surely decisions made with such knowledge will be wiser and the needs of future generations better served.

Early Use of the Southern Forest

The South's "first forest" stretched from the Atlantic Coast to the plains of central Texas and Oklahoma. The forest was as rich in variety as in extent. There were longleaf and slash pine on the Coastal Plain; loblolly and shortleaf pine and oak on the Piedmont; oak, hickory, and chestnut in the mountains; and oak, gum, and cypress in the bottomlands.

From the time of the first settlements in the South, the forests provided timber for home building and many other uses, a place for grazing livestock, and habitat for game. In colonial days, pine lumber produced by hand and in small water-powered mills, together with cypress lumber and shingles, were used for most local construction, as well as for limited exports from the region. Barrels and casks provided a means of transport of tobacco and other agricultural products. The naval stores industry furnished turpentine and rosin for the navies of Britain, the United States, and other countries. Shipbuilding and construction of port facilities rounded out the early commercial uses of both pine and hardwood timber. In addition, cutting timber for fuel represented a major use of southern forests.

As migrating settlers pushed inland from the coast, they cleared considerable portions of the southern forest for crops and pastures, towns, roads, and other uses. By 1860, some 43 percent of the total land area of the South was reported to be in farms. A substantial part of the land in farm holdings remained in forest, however, and both the original stands and subsequent regrowth of younger stands became a source of timber for the forest products industries. Since colonial times, farmers have also used forests, whether owned or not, for grazing livestock, with annual burning to improve forage a widespread practice.

With continued expansion of settlement and the harvest of timber, the area of cropland and pasture continued to increase, reaching a peak around 1920. Thereafter, with the spread of the boll weevil and the agricultural depression of the early 1920's, large areas of cropland and pasture became idle. In areas such as the Piedmont, cultivation led to severe erosion and additional cropland abandonment. During the hard times of the 1930's Depression and for a period after World War II, additional areas of croplands and pasture were left idle. A factor contributing to land abandonment was Federal reclamation programs that irrigated western lands, which then grew cotton and other products in competition with southern agriculture.

In time it also became clear that much of the soil in the South was not well suited for farming. Soils in the Coastal Plain and Piedmont are mostly strongly leached, rich in iron and aluminum oxide but deficient in many of the nutrients essential for the production of field crops. Most of the mountain areas are also unsuited for field crops. But these soils are suitable for growing trees, especially in the Coastal Plain and the Piedmont and in the valleys and coves of the mountains. Loess soil areas of the Mississippi Valley and bottomlands along the major streams have better soils for crops. However, because of wetness and periodic flooding, part of the bottomlands is also suitable only for growing trees.

Because of uncontrolled fires and the lack of forestry programs, only part of the cutover and idle cropland and pasture came back to forests. Trees did regenerate in many areas, however, and the early 1900's marked the beginning of what became the South's second forest—the forest that supplied the wood for the expansion of the pulp and paper industry in the 1930's through the 1960's.

As the second forest was developing, a number of changes were taking place that had major impacts on the forest situation. Growing concern among forest industry and government leaders about timber supplies and the lack of regeneration of large areas of cutover and idle croplands and pasture led to (1) the development of programs of fire protection, technical and financial assistance, research, and education; and (2) the establishment of managed forests owned by the public sector, forest industry, and other private firms and individuals. Fire protection and the educational programs associated with fire prevention were particularly effective, and a large part of the cutover and idle cropland and pasture regenerated naturally to pine and mixed pine–hardwood stands. Research that led to ways to protect and regenerate forests and utilize southern pine timber for woodpulp and plywood also had major impacts on the resource and forest industries.

These same forces continued to affect the timber situation for several decades. The programs of protection, technical and financial assistance, research, education, and management expanded, sometimes rapidly, from the 1940's through the late 1970's. The area of land used for crops and pasture continued to drop through the 1950's, sometimes at rapid rates, and much of the area regenerated naturally.

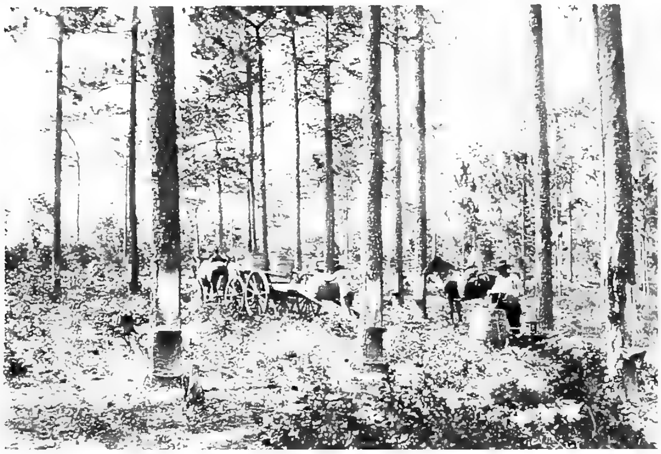
Commercial Uses of the Southern Forest

In 1962, the timberland area in the South reached a postwar peak of 197 million acres. Since then, the area of timberland has once again declined. Nevertheless, in 1985 timberland still comprised about 182.2 million acres, or 55 percent of the total land area of the South (app. table 1.1). The major causes of the recent decline in timberland areas have been new clearings for cropland and pasture and continuing expansion of urban and other nontimber uses.

The commercial utilization of the southern forest has a long history, beginning in the colonial era. Early settlers soon discovered the profitability of gum naval stores extracted from pines near the coast of the Carolinas. The industry also received a boost in 1705, when England offered bounties to colonial producers to increase naval stores production and free the British Navy from its dependence on supplies from Baltic countries. Like most extractive industries, naval-stores producers performed little processing and mainly exported gum rather than rosin and turpentine. The industry grew slowly until the 1840's, when new producers began operations in Georgia, Florida, and the Gulf States.

Extracting gum or pitch is hard on tapped trees. Until the early 1900's, workers cut deep boxes in young trees to gather the gum that dripped down, but the process almost always destroyed the tapped tree by admitting disease and insects and by reducing resistance to windstorms. Customary annual burnings to "green up the grass" frequently destroyed the "turpentine orchards" as well as other forests.

In 1901, the destructive methods of tapping and the depletion of resources prompted a young chemist, Charles Herty, to adapt to the southern forests a French method of gathering gum. Using two galvanized iron gutters and a clay cup, Herty demonstrated that boxing was not necessary and that



The production of pine gum for naval stores—turpentine and rosin—was one of the early and important uses of pine forests in the South. This continued for a long time, but since 1930, gum production has declined steadily. The southern pulp industry is now the primary source of turpentine and rosin.

his method allowed the trees to continue to produce gum longer. Investigations by the U.S. Division of Forestry showed that tapped trees produced lumber as strong as that from untapped trees and did not need to be discarded as waste.

The cup and gutter method was widely adopted in the naval stores industry. Subsequent decades saw further progress in chemical stimulation of gum flows and in selecting and breeding genetically superior trees that produced high yields of gum.

In 1900, both rosin and turpentine were produced entirely by the distillation of gum from southern pines (figs. 2.1 and 2.2 and app. tables 2.1 and 2.2). The gum naval stores industry has declined steadily in importance since the 1930's. This decline reflects in part the final cutting of old-growth timber, more recent labor shortages, some drop in markets for naval stores, and particularly the development of alternative sources of supply. Beginning in the 1920's, steam distillation of stumps left during logging of old-growth pine stands produced sizable quantities of both rosin and turpentine. The production process peaked in the early 1950's and has subsequently dropped to low levels. In recent decades, the drop in gum production and steam distillation has been nearly offset by major increases in recovery of tall oil and turpentine from the sulfate pulping process at southern pulp mills, now the primary source of rosin and turpentine. In 1984, tall oil represented 76 percent of the total production of rosin, while sulfate turpentine made up 93 percent of the total production of turpentine.

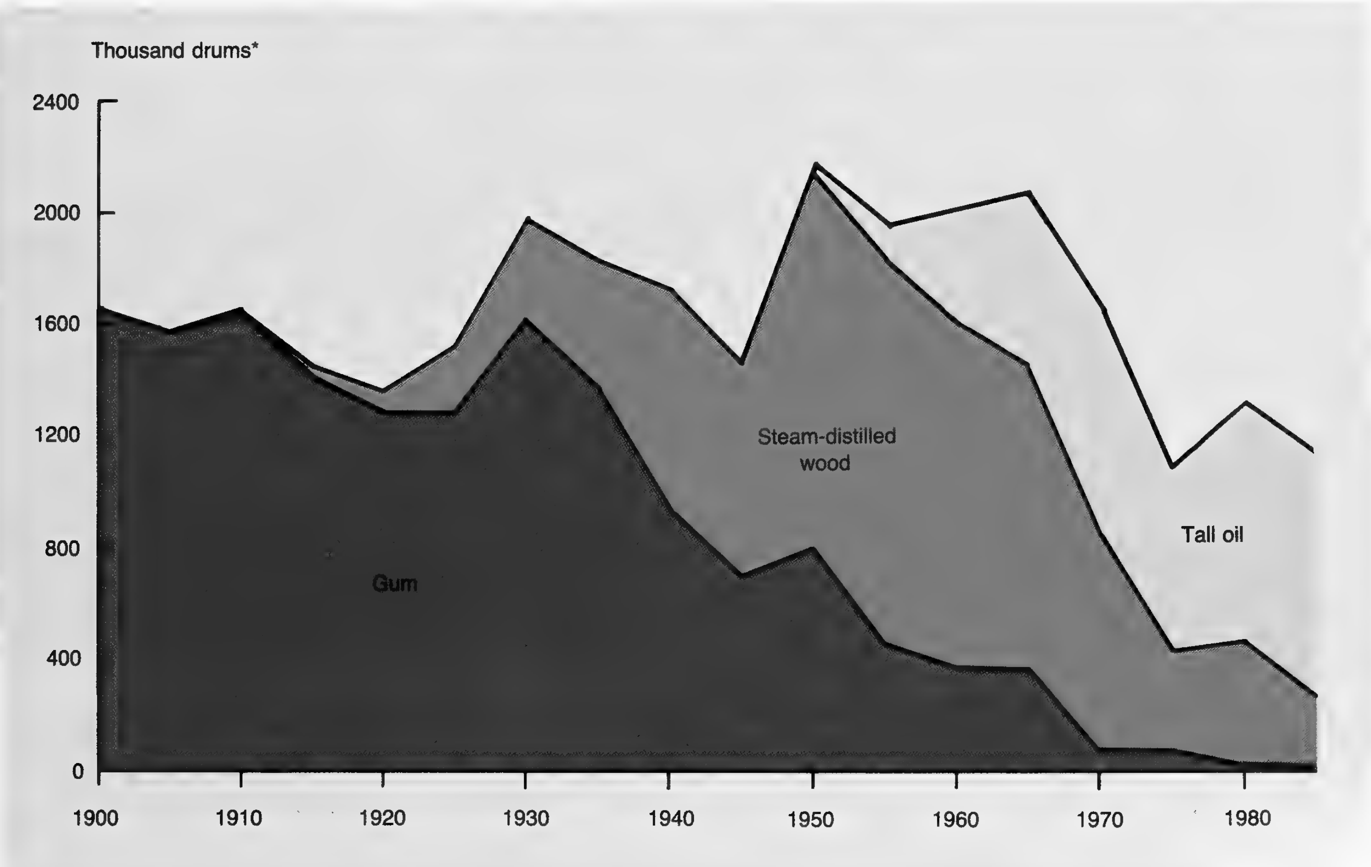


Figure 2.1—Rosin production in the United States, by source, 1900–84

*520-pound drums for steam-distilled wood and tall oil; 517-pound drums for gum

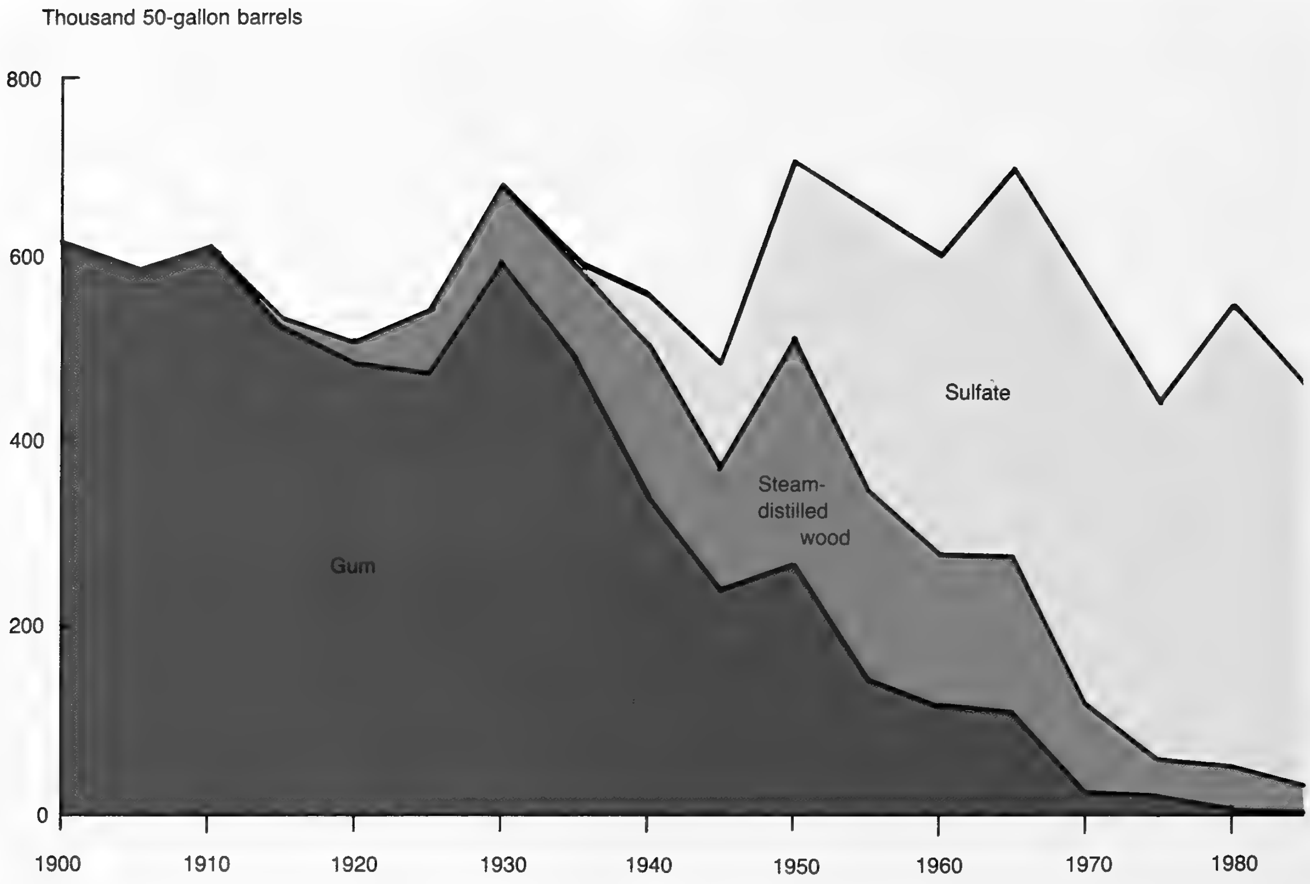


Figure 2.2—Turpentine production in the United States, by type, 1900–84

Expansion of the Lumber Industry

In terms of acreage and volume of timber harvested, most of the timber harvested from the first southern forest was used by the lumber industry. Beginning with the 1880's, sawmills became the dominant industry in the southern economy. Demand for lumber grew rapidly in the Northern States at a time when the old-growth timber stands of the Northeast and Lake States regions were nearing exhaustion. The postbellum railroad boom laid track all over the South, opening up large areas of old-growth forests. Entrepreneurs bought large acreages of high-quality timber for nominal sums like $1.25 to $10 per acre, the going rate for undeveloped land.

The switch to steam power meant more than the expansion of railroading. Large sawmills and logging operations adopted steam-powered steel band saws that made possible the manufacture of accurately cut lumber in quantity. The many large sawmills built in the region to harvest the old-growth timber typically included two or more band saws, and often gang saws as well, with capacity to produce in excess of 100,000 board feet of lumber per day. Usually timber firms found it necessary to build a company town, with housing, a company store, schools, and churches.

Most of the timber harvested from the first forest in the South was used by the lumber industry. In the 1880's, with the development of markets for lumber in the North, a railroad system in the South, and steam-powered band saws, increasingly large volumes of old-growth timber were harvested and cut into lumber. Production peaked in 1909, when more than 21 billion board feet of lumber were sawed.

In many cases, pressures to reduce indebtedness and to hold down taxes on old-growth timber contributed to rapid clearcutting and liquidation of the timber resource. When available timber was exhausted, the firms moved their operations to new sources of supply and often abandoned their company towns. Dismantled mills and deserted communities were numerous and eloquent reminders of the migratory nature of this early lumber industry.

The lumber produced by the large mills that operated in southern old-growth forests was of high quality, with much of it destined for export to foreign countries as well as to destinations in the Northern United States. Additionally, large numbers of small "peckerwood" mills produced generally lower grade lumber for local uses, especially in periods of strong markets and high prices. During times of low lumber prices, these small mills stood idle, as their operators resorted to farming to tide them over.

The record of lumber production in the South is shown in appendix tables 2.3–2.9. In 1869, the earliest year for which volume data are available, total production amounted to 1.5 billion board feet. This included 1.1 billion board feet of softwoods, nearly all pine, and 357 million board feet of hardwoods, mostly oak. In the following decades, production increased rapidly and by 1899 amounted to over 12 billion board feet (fig. 2.3). Softwood production was 9.8 billion board feet; hardwood, 2.3 billion.

Production continued to increase until 1909, when it reached a peak of 21.2 billion board feet (17.3 billion of softwoods and 3.9 billion of hardwoods). Production continued at very high levels through the 1920's, but in the early 1930's, it dropped sharply as the effects of the Depression hit the industry. There was a slow recovery, and during World War II the volume produced exceeded 15 billion board feet in some years. The 1950's saw another decline in output. Although complete data by species have not been available since 1954, available information indicates that total production was around 10 billion board feet (about 7 billion of it softwoods) in most years from the mid-1950's through the early 1980's. There has been an increase in the last few years. Output in 1986 was estimated to exceed 15 billion board feet.

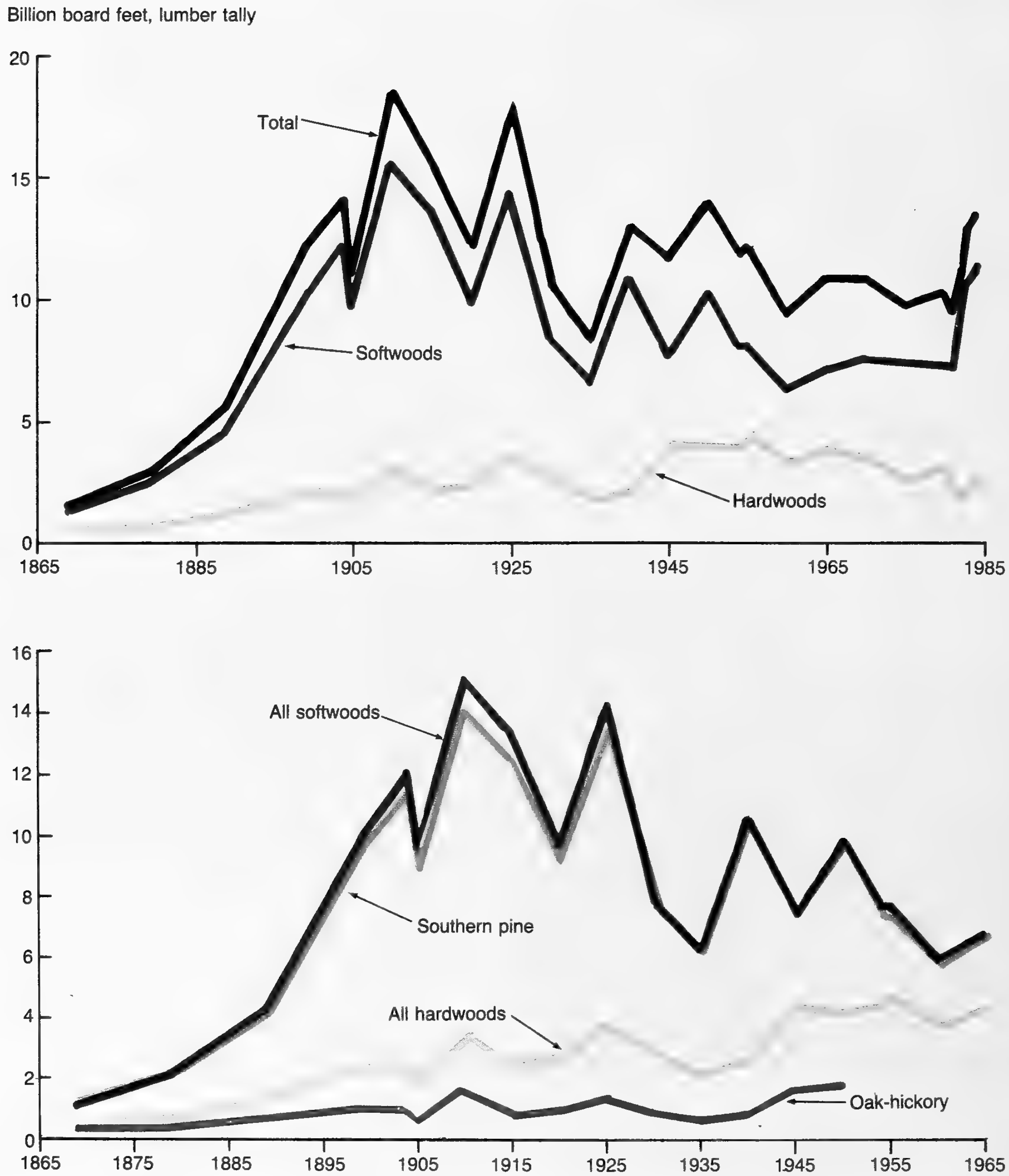


Figure 2.3—Lumber production in the South, by softwoods and hardwoods, 1869–1984, and by major species 1869–1965

Softwood Lumber Production

Southern yellow pine has always composed most of the lumber produced in the South, and in most years nearly all of the softwood lumber production (app. table 2.3). In the 1870's pine (yellow pine) lumber production in the Southeast region exceeded that in the South Central region, with Georgia the leading State (app. table 2.5). By 1889, however, the South Central region had higher production. In that year, both Texas and Alabama joined Georgia in producing over a half billion board feet of pine lumber.

Just after the turn of the century, seven Southern States were each producing a billion board feet of pine lumber per year. Peak production in a State was reached in 1913, when 3.1 billion board feet were produced in Louisiana, the leading State for pine lumber production from the early 1900's until the mid-1920's. During this time, production occasionally exceeded 2 billion board feet in Mississippi and Texas, and 1 billion board feet in all States in the South except South Carolina, Tennessee, and Oklahoma.

In the early 1900's and into the 1920's, cypress lumber production generally ranged between 600 million and 800 million board feet a year (app. table 2.6). Most of the cypress was cut from the bottomland forests in Louisiana, although production exceeded 100 million board feet for many years in Florida.

In recent decades, with the recovery of the forests in the South, the production of softwood lumber has increased above the low levels of the early 1930's. However, the harvest of the young-growth stands has yielded lumber of lower quality than that produced from the old-growth stands. Nevertheless, southern pine lumber has continued to find a place in construction markets, and in recent years especially those markets using preservative treated lumber.

Hardwood Lumber Production

As in the development of the southern pine lumber industry, the depletion of old-growth hardwood timber in the Northeast and Lake States caused manufacturers to turn to the South for a new source of hardwood supply. North Carolina saw the development of an important furniture manufacturing center whose output eventually rivaled both in quantity and quality the furniture made in New England and Michigan. The organization of the National Hardwood Lumber Association in 1898 did much to bring order and enforce grading standards within the industry.

In terms of volume, hardwood lumber production in the South has never approached that of softwoods. From 1900 through the 1920's, production generally ranged between 2 billion and 3 billion board feet a year (app. table 2.3). As with softwoods, production dropped during the Depression, but in the late 1940's, production rose and since then has remained between 3 billion and 4 billion board feet in most years.

Hardwood production has been spread among a number of species. The largest production has been oak and hickory (app. table 2.7). Red gum, tupelo, ash, cottonwood, and elm have also been important species in terms of volumes cut (app. tables 2.8 and 2.9). Tennessee, Arkansas, and Virginia have been the most important producing States.

Furniture and railroad crossties have long been principal uses of hardwood lumber. Other major uses include items such as pallets and manufactured products for both domestic and export markets.

Technological Breakthroughs

The major role played by the lumber industry in the South has been supported in part by continuing technological developments. In addition to early improvements in logging and milling equipment, development of wood-preservation chemicals and techniques helped build and hold markets for products such as railroad crossties and sawn timbers, poles, piling, and posts. A major problem of discoloration of southern pine lumber, blue stain, was eliminated in the late 1930's. Research conducted at the Southern Forest Experiment Station in New Orleans led to practical methods of controlling the fungus causing the problem.

Later development of log debarkers, logging equipment, and mill machinery by both equipment manufacturers and timber companies in the South, and their widespread adoption by the forest industries, helped reduce costs and increase utilization of available timber supplies. Thus the slabs, edgings, and similar material produced at sawmills, which previously had been wasted, became in time an important part of the raw material used by a rapidly expanding pulp and paper industry, as well as a source of income to lumber manufacturers. Research on laminated beams and timbers at the Forest Products Laboratory in Madison, WI, and the subsequent development of manufacturing facilities in southern mills to produce these new products led to the use of young-growth southern pines for high-quality end products.

By the early years of this century, the rapid harvest of timber, uncontrolled wildfires, and grazing by livestock had resulted in nearly complete clearing of the forest in many parts of the South. Observers in some areas could look for miles and see lands entirely stripped of trees. As in other regions, people generally assumed at the time that most cutover lands would be converted to crop and pasture use. The protection of forest cover was considered to be of little consequence. Most cutover lands were not developed for crops, however, but left untended and used by livestock, if used at all. There was little in the way of fire protection and replanting until the 1930's. Even then, the acres protected and planted were modest when compared to the total acreage.

During the early years, however, some individuals and institutions attempted to promote conservation of the South's forests, and their efforts laid the basis for later programs. Although lacking the resources and public support to make conservation a reality at the time, they set the stage for all that followed by creating public understanding of forest problems and the opportunities to apply scientific knowledge and management practices, especially fire protection and reforestation.

By the early years of this century, the harvest of timber, uncontrolled wildfires, and grazing by livestock had resulted in large areas of nonstocked timberlands in the South. Observers in some areas could look for miles and see lands entirely stripped of trees, lying idle and unused for any productive purpose.

Early efforts to awaken the American public to the need to renew forest resources included the work of Franklin B. Hough (1878, 1880, 1882) in his comprehensive 1878 "Report Upon Forestry." It was the first detailed general assessment of the forest situation. Later, the Forest Service in the U.S. Department of Agriculture began the long-term process of studying American forests and promoting forestry through an increasing flow of reports, articles, and other information on the Nation's forest situation and the need for forest conservation.

Another impetus for forest protection and management in the United States came in the form of new organizations. A number of lumbermen and scientists created the American Forestry Association in 1875 through the influence of John Aston Warder. In 1885, the American Forestry Association merged with the American Forest Congress and in 1888 with the Southern Forestry Congress. Taking a cue from this national organization, a North Carolina Forestry Association was formed in the same year with the encouragement of State Geologist J.A. Holmes. This was the first of a series of State forestry associations established in following years. Like their national counterparts, these groups worked to advance the cause of forestry and to encourage passage of State and Federal forestry legislation.

Some individuals sought to spread the gospel of sound forestry by example as well as by word. Gifford Pinchot, the first trained American-born forester, came in 1892 to North Carolina, where he managed the forests of George Vanderbilt's Biltmore estate. In 1898, Pinchot became Chief of the Division of Forestry in the Department of the Interior (upgraded to Bureau in 1901) and soon converted President Theodore Roosevelt to the cause of a national conservation crusade. In 1905, the forest reserves were transferred from the Department of the Interior to the Department of Agriculture's newly created Forest Service, with Pinchot as Chief.

At the time, there were no forest reserves in the South. However, in the 1890's, a movement had begun in North Carolina and New Hampshire supporting the creation of national parks and forest reserves in the East. The Division of Forestry, in cooperation with the Geological Survey of the U.S. Department of the Interior, conducted a field investigation of the Southern Appalachian region. Their report, submitted to Congress in 1902 by President Roosevelt, detailed widespread damage to the region's forests. The report also cited cleared and abandoned farmlands and large-scale erosion and flooding as ever-increasing problems.

The movement for eastern forest reserves made little progress for several years because many Congressmen felt it was inappropriate, if not unconstitutional, for the Federal Government to acquire private land. There was, however, progress in other ways. In 1908, President Roosevelt convened a Conference of Governors on the Conservation of Natural Resources at the White House. Nearly 500 people attended, including 22 governors, 11 personal representatives of governors, and 98 representatives of 31 State commissions. The Governors' Conference, followed by a Joint Conservation Conference with a wide variety of participants, stimulated many State Governments to think about establishing State forestry agencies.

The creation of Southern State forestry agencies followed the national lead. In Alabama, citizens including Charles Mohr, the author of an early U.S. Division of Forestry study on pines of the Southern United States, prompted the creation of a State forestry commission. In Louisiana in 1907, Henry E. Hardtner, a pioneer lumberman, helped organize the Louisiana Forestry Association, which began to play an important role in southern forestry.

Similar forestry commissions or associations were in time established in all the Southern States. Among early crusaders, Austin Cary of the USDA Forest Service played a strong role in advancing forest conservation throughout the South and has often been called the father of southern forestry. His message was simple—good forestry is good business. Yet Hardtner and Cary were the exceptions. As a general rule, there was little interest in leaving seed trees, as Hardtner suggested, or in practicing comprehensive fire control, a favorite theme of Cary's.

The Weeks Law

Nevertheless, the growing concern over forest conditions expressed by citizens' groups, the increasing flow of forestry investigations and reports from the Forest Service, and recommendations of the Governors' Conference of 1908 resulted in the enactment of the Weeks law in 1911. This act provided Federal matching funds to cooperate with State agencies in protecting forests from wildfire and authorized Federal acquisition of land for national forests in the watersheds of navigable streams.

Progress in organizing State fire protection under the Weeks law was slow in the South, both because Federal funding was limited and because State legislatures were reluctant to appropriate matching money for programs that ran counter to prevailing attitudes toward use of fire in southern forests. Nevertheless, additional Southern States gradually established forestry agencies to carry out fire control and other forestry programs, beginning in Virginia and Texas in 1915. The last State to establish such an agency—Arkansas—created its State Forestry Commission in 1933 with money from private contributions.

Setting up State forestry agenices to carry out forest protection and management programs in the South was greatly aided by the experience of progressive industrial landowners. Henry Hardtner's success in protection, planting, and sustained-yield cutting on lands of the Urania Lumber Company in Louisiana stimulated others to improve forest practices. In 1920, the Great Southern Lumber Company at Bogalusa, LA, began under Chief Ranger F.O. Bateman a protection and tree-planting program that resulted in thousands of acres of pine plantations. This effort served as a successful forerunner for the modern tree-planting programs conducted throughout the South. Other companies, such as Arkansas's Crossett Lumber Company, which in 1915 established a close and fruitful relationship with Professor H.H. Chapman of the Yale Forestry School, were also in the forefront of early industrial forestry efforts.

One of the early important pieces of forestry legislation was the Weeks law of 1911. This act provided for Federal matching funds to cooperate with States in protecting forests and forest lands from fire. Such protection was the first essential step in regenerating southern forests.

Lumber Trade Associations

During this same period, lumber manufacturers sought to strengthen their fragmented and competitive industry by forming industrial trade associations. A group of lumber manufacturers in Missouri and Arkansas organized an association as early as 1883. This was succeeded by a regional organization, the Southern Lumber Manufacturers' Association, which became the Southern Pine Association in 1915 and later changed its name to the Southern Forests Products Association to reflect its broader coverage of wood products. In the Mississippi Valley, an organization of hardwood lumber manufacturers established in 1899 later became the Hardwood Lumber Manufacturers Association.

In time, all commercial species and products were represented by trade associations. These regional associations had common characteristics and, in many cases, common membership, with similar groups in the rest of the Nation. They sought to establish lumber-grading rules and inspection procedures; compile statistics on lumber production, shipments, and prices; deal with organized labor; promote wood products; and lobby Congress and State legislatures to advance the industry's interests.

Increasing concern over conditions on the vast area of cutover and unproductive land in the South led the Southern Pine Association in 1917 to join with the Southern Settlement and Development Organization for a conference on land use. Not surprisingly, principal attention focused on possible crop and pasture use of cutover lands. Much education, research, and experience had to occur before the use of southern forests for sustained timber production got serious attention. Later, in the Depression years of the 1930's, the Southern Pine Association played a leading role in developing article 10 of the short-lived National Industrial Recovery Act. The article set standards of approved

forest practices for the forest industries, including fire control, selective cutting, and reforestation.

The Clarke–McNary Act

The Weeks Act of 1911 recognized that forest fire protection was the essential first step in conserving and managing timber resources, but funding was limited and many of the Southern States were slow to establish forestry agencies eligible for the matching funds that were available. The "Capper Report" of 1920, compiled by the USDA Forest Service in response to a Senate request, described continuing forest depletion and pointed out the need for more forest protection and management. This report and other efforts led to the Clarke–McNary Act of 1924, which authorized increased funding for cooperative Federal–State fire protection programs.

In addition, the Clarke–McNary Act provided for new programs of assistance in tree planting on private lands, expanded acquisition of lands for national forests outside watersheds of navigable streams, increased assistance to farmers in forest management and utilization, and a comprehensive study of problems of forest taxation. The Clarke–McNary Act set a pattern, followed in subsequent legislation, for cooperative Federal–State programs of education and assistance to forest owners and operators.

Reforestation and Wildlife Habitat Improvement

The movement to reforest cutover lands in the South continued to grow in the 1930's, especially with the programs of the Roosevelt administration. The widening of the government role in the South also included early efforts to protect wildlife. The Civilian Conservation Corps began to improve habitat for wildlife by replanting forests, constraining soil erosion, and reducing siltation. Some Corps camps made a direct effort to establish wildlife refuges in North Carolina and Florida. Some State Governments also began to establish wildlife refuges and control hunting. The work of conservation writers such as Aldo Leopold and Robert Marshall was influential in establishing the need to preserve and manage all wild resources. These and other wildlife conservationists and writers laid the foundation for later efforts to designate wilderness areas and adopt wildlife management policies in the South.

In the 1930's, the Civilian Conservation Corps replanted and protected forests, constrained soil erosion, and improved wildlife habitat. The Corps played an important role in conservation in the South and in the Nation.

Forest Fire Control in the South

Fire has always been an important force shaping southern forests. The use of fire by Indians to clear land and improve hunting contributed to maintaining the pine forests found by early European explorers. In natural succession without fire, various tree species compete with pines in a process that yields first mixed pine–hardwood and, in time, hardwood forests.

Woods-Burning vs. Fire Protection

Colonial settlers and their descendants adopted the Indian use of fire and expanded the practice for such purposes as improvement of grazing and control of pests. Use of fire grew into a deep-seated part of the southern rural culture, and early efforts at fire-prevention education and legislation faced strong opposition, particularly from users of the forest range. Arson was also common over much of the South.

Lack of funding was the major handicap to early efforts by State and Federal agencies to change the woods-burning habits of southerners. Although the Weeks law offered matching financing for fire protection, the amount of Federal fire control spending came to only a few thousand dollars in 1920. Passage of the Clarke–McNary Act of 1924 gave a needed boost, and Federal cooperative funding for control of wildfire in the South grew to about $5 million (1982 dollars) in 1930. State funding had increased more rapidly, to nearly $10 million (fig. 2.4 and app. table 2.10). Results accrued quickly as the annual number of acres burned dropped below the low of a decade earlier. Federal fire-control spending continued to grow rapidly, to nearly $18 million during the 1960's, but thereafter dropped sharply in the early 1980's, to only $3.6 million in 1983.

State expenditures in the South rose from about $9.7 million (1982 dollars) in 1930 to over $90 million in the early 1980's.

The increases in funding for forest fire protection enabled fire protection organizations to steadily increase the area of State and private land given protection from wildfire. Areas protected rose from 70 million acres in 1930 to more than 233 million acres in the 1980's (app. table 2.10).

These increases in funding and areas protected over the past half century resulted in a great reduction in acreage burned by wildfires. After 1930, acreage of timberland burned dropped from more than 2 million per year to as low as 279,000 acres in 1983 (fig. 2.4 and app. table 2.10). The reduction in area burned through more effective fire protection was the most important single factor in obtaining natural regeneration in the South's second and third forests.

Much of the success in meeting the problem of wildfire must be attributed to both Federal and State forestry agencies and forestry associations in their crusades to persuade rural people to stop woods-burning. In 1916, for example, various conservation groups in the South, together with the American Forestry Association and the Society of American Foresters, organized a Southern Forest Congress to work for the protection of southern forests—the first of a series of similar congresses that were held through 1930. These were later replaced in a sense by the founding in 1920 of the Association of State Foresters, which continued to work to advance forestry programs throughout the South. In the 1950's, a conference, also sponsored by the American Forestry Association and dealing mainly with fire legislation and law enforcement, helped bring about legislative and court action to curb fire-setting by arsonists. The American Forestry Association and various other associations and conservation groups have continued to play a significant role in fire prevention through publications, meetings, conferences, and reports on the forest situation and policy alternatives.

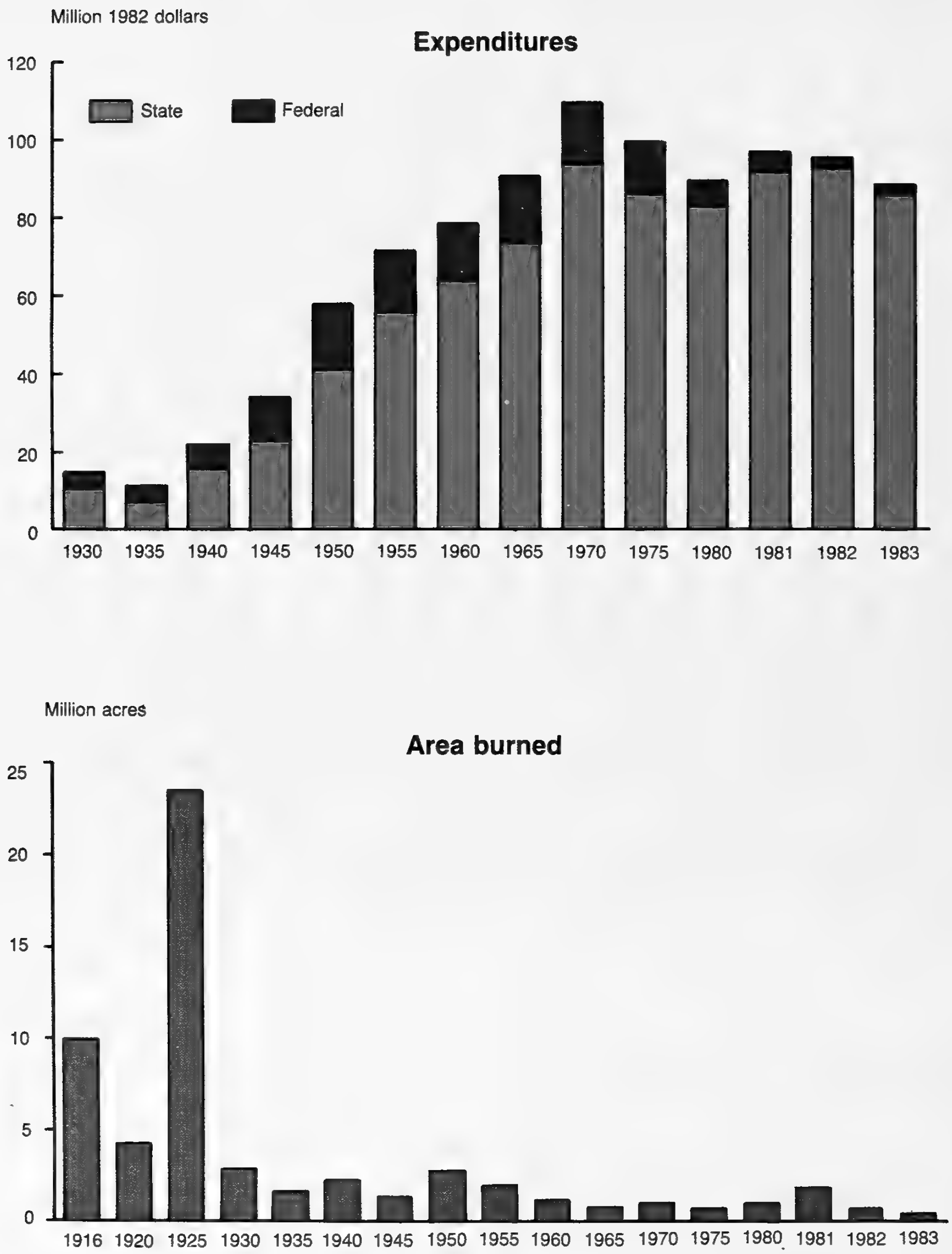


Figure 2.4—Expenditures for protection from wildfire and area burned in the South, selected years, 1916–83

Meetings of professionals who understood the technical and economic impact of woods-burning was one thing, but getting the average rural southerner to view the issue the same way was another. Going to the people in person seemed the only way to succeed. In 1928, Ovid Butler, executive secretary of the American Forestry Association, proposed a multi-State tour to educate rural folk about the dangers of woods-burning. For the next 3 years, W.C. McCormick led the "Dixie Crusaders," barnstorming through Georgia, Florida, and Mississippi, covering 300,000 miles, and reaching some 3 million people. The Crusaders used every means of communication available to get their message across: speeches, rallies, leaflets, press, posters, essay contests, and motion pictures. The American Forestry Association produced its own movies and employed plot, humor, romance, even melodrama, to get the message across.

Woods-burning to improve grazing, control pests, and clear underbrush to improve hunting was a deep-seated part of southern culture. Much of the success in controlling wildfires in the South must be attributed to efforts by public and private agencies to educate rural people about the dangers of fire. Educational trucks equipped to show movies and colored lantern slides toured the South in the late 1920's and early 1930's and were an effective part of the program.

Fire Protection in the Thirties and Forties

Fire protection efforts during the 1930's were also greatly assisted by the work of the Civilian Conservation Corps. Young men of the Corps fought fires; built roads, trails, bridges, fire towers, and telephone lines; and planted trees. At the peak of the programs, there were 311 forestry camps in the South—125 on national forests and 186 camps under State foresters, who directed projects located mainly on private lands. Georgia had more camps than other Southern States because of the large area of land given fire protection by local timber protective organizations that helped fund cooperative work.

With the onset of World War II, protection efforts in the South became more difficult because personnel demands elsewhere left fewer firefighters to protect the forests. The disbanding of the Civilian Conservation Corps in 1942 took away a major source of crews for controlling fires, a blow compounded by the loss of State foresters and seasoned fire guards to the military and defense industries. Southern State forestry agencies attempted to fill the gaps by recruiting larger volunteer crews and promoting the use of technical innovations, especially the tractor-plow.

There was an added need to protect military operations: smoke had to be reduced at airfields and military bases and fires near the coast had to be prevented to avoid silhouetting shipping to submarines. Fire agencies used the threat of legal action under the Federal Subversives Act to deter potential arsonists.

Appeals to patriotism to protect against fire coincided with the growing value of pulpwood to feed the papermaking industry. Pulp and paper companies, investing in new plants and the forests to feed them, wanted better protection than before. With rising demands for fire protection, both Federal funding and State expenditures steadily increased throughout the war years.

Nevertheless, at the end of World War II, there were still millions of acres of forest in the South without fire protection and substantial areas of idle cropland and pasture reverting to trees. However, the growing realization of the value of forests for expanding industrial uses stimulated State legislatures to strengthen protection and management efforts, with a consequent marked rise in funding and areas protected and a decrease in acreage burned (app. table 2.10).

In carrying out these expanded fire protection programs, forestry agencies in many States worked with timber protective organizations usually made up of large forest owners. In some locations, owners funded fire protection by simply paying a per-acre assessment to the State. Elsewhere, local organizations carried out protection programs with their States reimbursing a share of the cost.

Prescribed Burning

Another factor in the control of wildfires was the development of prescribed burning as a forest management practice. The early goal of fire exclusion in southern forests set by the Forest Service and other early foresters proved to be unrealistic. Field observations and experience plus studies by researchers at the Southern Forest Experiment Station and elsewhere pointed to periodic prescribed burning as a practical way to limit destructive wildfires. In the early years, settlers had found that light burning in pine forests prevented the accumulation of flammable material that could fuel raging wildfires. Burning the woods also benefited grazing by bringing green grass in the spring.

Although opposed for a time by some forest administrators, who feared the fight against wildfire would be compromised, prescribed burning has been widely adopted and has effectively reduced fire hazards and acreage burned while saving on the costs of fire control. Losses of timber and other resources have been reduced. Where pine stands are desired, stand composition has been improved by favoring pines over unwanted hardwoods and other vegetation. Wildlife values, livestock grazing, and recreation also have been enhanced. It is estimated that several million acres have undergone prescribed burning annually in recent years. Passage of fencing laws in various States also has helped reduce the free ranging of livestock and lessened the incentive for general burning to improve livestock forage.

Research and Educational Efforts

Fire programs of prevention, suppression, and prescribed burning have been enhanced by many research and development efforts of public agencies, educational institutions, and the forest industries. The technology of firefighting developed rapidly after World War II with the use of tractors and fire plows, improved access, use of aircraft for fire detection and direction of ground crews, development of two-way radio communication, and successful experience with use of fire retardants dropped from aircrafts. Recent concern about smoke from forest fires also stimulated research which indicated that impacts can be lessened by reducing wildfires and using prescribed burning at proper times.

Following the Dixie Crusaders, various educational programs have been carried on by private groups and government agencies. One of the most successful is the Smokey Bear program of the National Advertising Council, the USDA Forest Service, and State forestry departments, which was started during World War II as a way to publicize the danger of human-caused forest fires. The Keep Green and Tree Farm programs of industrial and other private owners and efforts of organizations such as the Tall Timbers Research Station in Florida have likewise helped get across the message of wildfire prevention.

Since 1956, fire protection efforts have also included a series of regional compacts between groups of States and the Federal Government. Two multi-State fire compacts in the Southeast and the South Central regions have served well in coordinating efforts and resources among all the State and Federal agencies concerned in fire protection. The mechanism for cooperation in use of personnel and equipment under emergency conditions worked well in the destructive fire season of 1985.

As a supplement to general fire protection on forest lands, the Rural Development Act of 1974 provided Federal funds for use by State foresters in organizing, training, and equipping volunteer fire companies to protect communities in rural areas. These fire companies also have been integrated into the first line of attack on nearby forest and brush fires.

In summation, it can be fairly said that fire protection is the most widespread and most effective timber management activity practiced in the South. It made possible the natural regeneration of much of the South's second and third forests. In addition, controlled fire or prescribed burning has become a widely used management practice. With application in the reduction of fire hazard, site preparation for stand regeneration, and control of undesirable vegetation, prescribed fire has become an important tool in regenerating pine after harvest.

It can be fairly said that fire protection and the use of prescribed burning are the most widespread timber-management activities practiced in the South, and the most effective. Controlled fire has made possible the natural regeneration of much of the South's second and third forests. With the decline in random and destructive wildfires, controlled fire or prescribed burning has become an essential, relatively inexpensive, and effective management tool in pine forests.

The extensive areas of cutover and nonstocked lands that characterized much of the South in the 1920's have, for the most part, been regenerated to some form of forest growth. Most of this progress was the result of natural restocking following the spread of increasingly effective protection from wildfire. The establishment of pine plantations, however, also accounted for extensive reforestation after World War II.

Federal Assistance for Reforestation

The Clark–McNary Act provided limited funds for cooperation with the States in obtaining seeds and seedlings for reforesting denuded farmlands. The Agricultural Conservation Program (ACP) beginning in the 1930's and the Soil Bank Program of the 1950's also made possible additional planting of farmlands.

These early reforestation efforts, as well as early forestry extension and technical assistance programs, were funded through the U.S. Department of Agriculture and applied only to farm forests. In 1985, for example, there were some 40 million acres of timberlands in farmer ownerships, or about 22 percent of the total timberland area in the South at that time (app. tables 3.1 and 3.2). In earlier years, the acreage of timberland owned by farmers was much higher. The holdings of other individual private owners in 1985 comprised 66 million acres, or 36 percent of all timberlands in the South. These holdings were included in the Forestry Incentives Program (FIP) adopted in the 1970's to provide additional Federal funding for reforestation and timber stand improvement.

Areas planted or seeded to forest trees prior to the mid-1930's amounted to only a few thousand acres annually (fig. 2.5 and app. tables 2.11–2.13). Planting by the Civilian Conservation Corps crews brought about an increase in areas reforested during the late 1930's, but tree-planting programs nearly stopped during World War II. After the war, planting and seeding efforts increased sharply, particularly during the Soil Bank Program of the 1950's, to a peak of 1.7 million acres in 1959. Although planting declined greatly thereafter, it has been on the rise since the mid-1970's with the expansion of incentives such as State and Federal cost-shares, forest management assistance programs, and the reforestation tax credit enacted in 1980. In 1985, over 2 million acres were planted or seeded.

Tree planting during recent decades was greatly aided by development of relatively inexpensive tree-planting machines and availability of contractors to do the planting. Heavy equipment to prepare planting sites and effective herbicides to control competing hardwoods also became available.

A major part of the area planted in the South, particularly in recent years, is owned by the forest industries and other large companies. In 1985, for example, some 60 percent of the area planted or seeded in the South was on lands of the forest industries and certain corporate owners such as railroad and utility companies, compared to 35 percent on other private ownerships and about 5 percent on national forests and other public holdings. The expansion of reforestation efforts, particularly by the forest industries, reflected economic pressures to increase the productivity of timberland, availability of capital for long-term investments, and improved technology leading to relatively higher yields of timber on lands in plantations.

Part of the planting and timber stand improvement work on farmer and other individual private ownerships is attributable to Federal assistance under the Agricultural Conservation Program. This program to encourage farm conservation practices included some limited cost-share payments for tree planting, timber stand improvement and wildlife-habitat improvement. The Agricultural Conservation Program funding rose from about $450,000 (1982 dollars) in 1946, for example, to a peak of over $15 million in 1959 during the Soil Bank Program (app. table 2.14). In return for retiring agricultural land under this program, farmers received assistance in planting trees and annual payments thereafter during a contract period that usually ran for 10 years. Over a million acres were planted in 1959 under this special program. A peak of 250,000 acres of stand improvement work was reached in 1958.

After 1974, Agricultural Conservation Program funds were supplemented by Federal funding through the Forestry Incentives Program, a cost-sharing effort specifically aimed at improving the condition of both farmer and other individual private timberland ownerships by planting, stand improvement, site preparation for natural regeneration, and firebreak construction.

Up to 65 percent of planting costs and timber stand improvement costs are paid by Federal funds and the remainder by landowners. This cooperative program is administered jointly by two USDA agencies—the Forest Service and the Agricultural Stabilization and Conservation Service—and State forestry agencies. Under the Agricultural Conservation and Forestry Incentives Programs, tree planting took place on more than 200,000 acres and timber stand improvement on about 50,000 acres in 1980 and

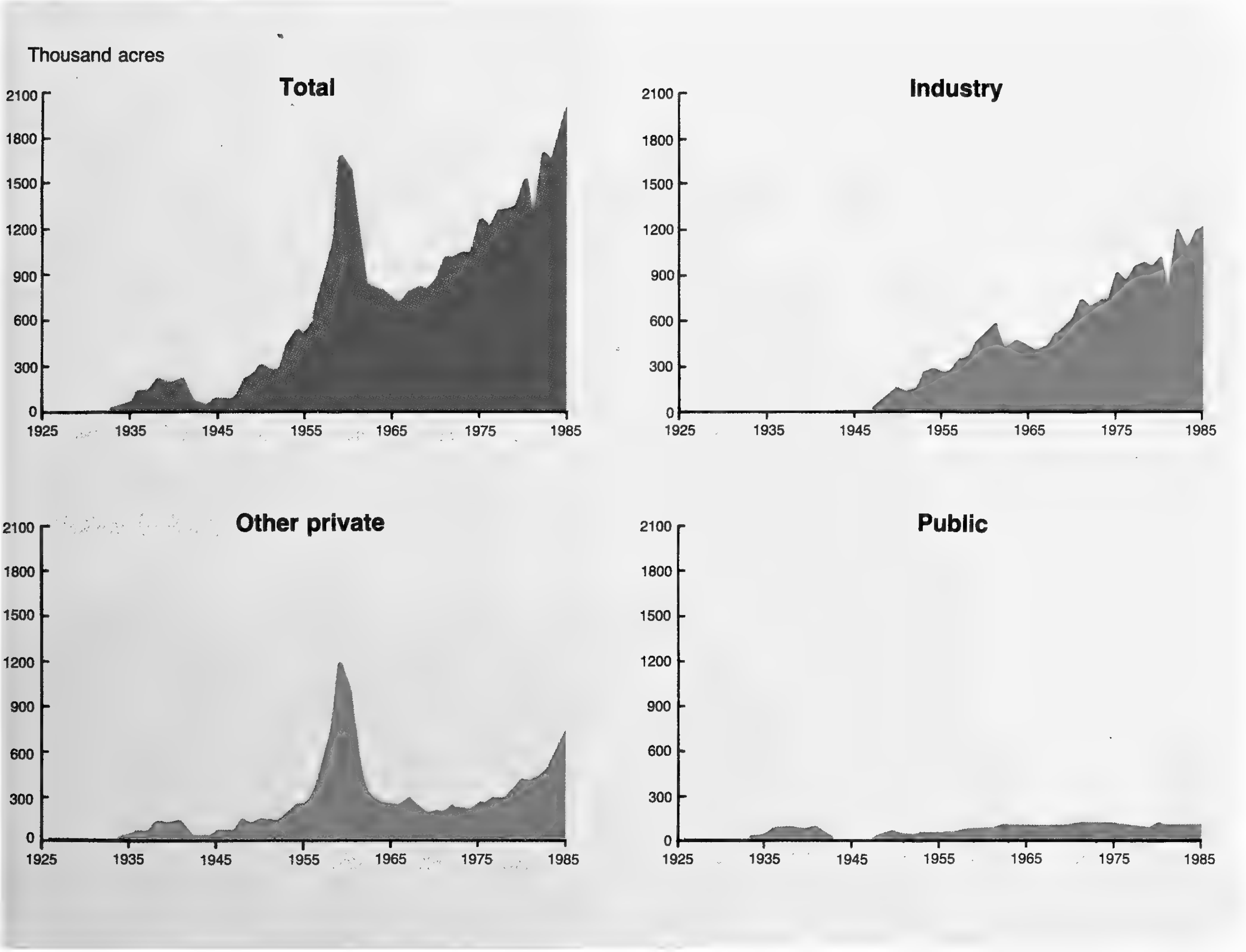


Figure 2.5—Regeneration in the South, by ownership, 1925–85

again in 1981, when nearly $16 million were expended each year for both programs. Funding for the Forestry Incentives Program dropped sharply in the following years (app. table 2.14).

The 1985 Farm Bill (Food Security Act of 1985) established a Conservation Reserve Program to compensate farmers for planting highly erodible cropland to trees or grass. Under this program, farmers receive annual rental payments for 10 years and conservation payments of up to 50 percent of eligible costs of establishing trees on the acreage placed in reserve. Under this program, as much as 3 million acres in the South could be planted to pine by 1990. This program is also cooperatively managed by Federal and State forestry agencies.

State Reforestation Programs

Some States have adopted special cost-sharing programs of assistance to landowners. For example, Virginia adopted a program in 1971 to assure expanded reforestation of pinelands. This effort has been financed in part by a severance tax. Every 2 years, the Virginia General Assembly appropriates funds based on the estimated severance tax receipts for the next 2 years to be matched by landowner contributions. These State funds are supplemented by whatever funds

are available from Federal sources such as the Forestry Incentives Program and Agricultural Conservation Program.

Complementing Virginia's reforestation act is its longstanding Seed Tree Law, aimed at ensuring prompt regeneration of harvested timberland. This law applies to any land where loblolly, shortleaf, pond, or white pine, and tulip poplar constitute 10 percent or more of the live trees 6 inches or more in diameter at stump height.

The law requires that a minimum number of seed trees per acre be kept uncut for 3 years following harvest. An amendment in the early 1950's permits landowners to clearcut without leaving seed trees, provided they secure the State Forester's approval of a tree-planting plan to be carried out following timber cutting. Site preparation is required to ensure that the young pine or poplar trees will be free to grow without competition from undesirable vegetation.

Another important part of Virginia's reforestation program is the public or area forester. Virginia assigns at least one area forester to each pineland county. The area forester enforces the Seed Tree Law and informs landowners of available forestry technology and financial assistance. The area forester often gives information on alternative timber management prescriptions and on the availability of private forestry consultants and vendors, and can help landowners obtain cost sharing.

About three-quarters of the pine stands harvested in Virginia are regenerated to pine—substantially above the rate in other States. Southwide, only a little over half of the pine and mixed pine–hardwood stands harvested in recent years have been regenerated to pine.

Mississippi, North Carolina, and South Carolina also have State cost-share forestry incentive programs. Texas and Florida are somewhat different. The Texas Forestry Association has formed the Texas Reforestation Foundation to provide financial assistance to landowners in return for a commitment to reforest and manage their land for at least 10 years. The program, which runs in cooperation with the Texas Forest Service, is funded by industry contributions. The Florida Forestry Association and the Florida Division of Forestry also administer a fund derived from donations by timber companies to supply landowners with seedlings. The contributions and donations are deductible as business expenses from Federal income taxes.

In 1985 Southwide, over 138,000 acres of other private lands were planted with non-Federal cost-share assistance, compared with 217,000 acres planted with Federal assistance (app. table 2.15).

Reforestation Trends

The reforestation programs conducted in the South over the past half century have produced a sizable area of plantations of southern pines, some of which have already been harvested. In 1985, tree plantations covered 20.9 million acres—or 24 percent of the total area of pine and pine–hardwood types in the South (app. tables 3.1 and 3.2). On forest industry lands, plantations totaled 13.2 million acres, or 47 percent of the 28 million acres of pine and pine–hardwood stands in industry ownerships. Plantations on other private and public ownerships amounted to 7.7 million acres, or 13 percent of the 60.8 million acres of pine and mixed pine–hardwood forests in these holdings.

The reforestation programs in the South over the past half century have produced a sizable area of pine plantations, some of which have already been harvested. In 1985, existing plantations covered 20.9 million acres—11 percent of the total area of timberland. Some pine plantations, and particularly those on other private ownerships, naturally regenerate to mixed pine–hardwoods or hardwoods after harvest.

Counteracting the substantial expansion of pine plantations in recent decades is the fact that many pine stands have been converted to hardwood types by harvesting the pines and allowing the subsequent natural succession of the land to mixed pine–hardwoods or hardwoods. Between 1952 and 1985, for example, the area of natural pine dropped some 31 million acres, or 43 percent, while upland hardwood types increased by 7.8 million acres (app. tables 3.1 and 3.2).

The programs of tree planting in the South have been materially aided by an extensive program of research, including, for example, investigations on management of tree nurseries that identified ways of limiting seedling losses from the diseases that often wiped out nurseries in the early days. Studies of genetic factors have provided guides to selection of seeds from trees of superior growth, form, and resistance to diseases such as fusiform rust. In 1985, for example, over 60 percent of the nursery stock produced in State nurseries consisted of genetically improved seedlings (app. table 2.15). All Southern States and many members of southern forest industries have established seed orchards, and planting of genetically superior stock continues to increase. Selection and breeding programs underway should soon yield further improved second generation planting stock.

Forestry Research

Formal research on problems of southern forestry began in the 1920's, when the USDA Forest Service established the Southern Forest Experiment Station in New Orleans and the Appalachian Forest Experiment Station in Asheville, NC (renamed the Southeastern Forest Experiment Station in 1952). In prior years, some studies of forest and forest industry problems pertaining to the South had been conducted, including work on wood preservation and naval stores production, but these efforts were of limited extent.

During the 1920's, the small staffs at the Southern Forest Experiment Station began a program of investigations on various aspects of timber management, including problems of fire control and regeneration of cutover lands. Passage of the McSweeney–McNary Forest Research Act in 1928 gave additional impetus to research on southern forestry problems by authorizing increased funding of studies in all aspects of forestry. Also in the 1930's, the slowly expanding research program in the South was materially aided by work of the Civilian Conservation Corps and the beginning of long-term cooperation with southern forest industries and southern universities.

Funding

Funding for forestry research at both southern experiment stations increased moderately during the 1930's and 1940's but grew rapidly after World War II. Forest Service funding rose from about $6.8 million (1982 dollars) in 1950 to a level of roughly $25 million in the sixties and seventies (fig. 2.6 and app. tables 2.16 and 2.17). Some of these funds were allocated to universities for cooperative research projects. On the other hand, Forest Service funds have often been augmented by substantial financial and other contributions from State agencies and the forest industries.

Additional Federal funds are made available for research through the McIntire–Stennis program administered by the USDA Cooperative State Research Service. These funds are transferred directly to forestry schools in the various universities. Similarly, research funds have been made available since 1985 through the Forestry Competitive Grants Program. Competitive Grants funds are provided through the Forest Service's budget, but the program is administered by the Cooperative State Research Service.

The funding thus made available has supported studies by literally hundreds of scientists in many disciplines. Forest Service scientists along with researchers in universities and other organizations have issued thousands of publications providing information on essentially all aspects of southern forest and range management and utilization.

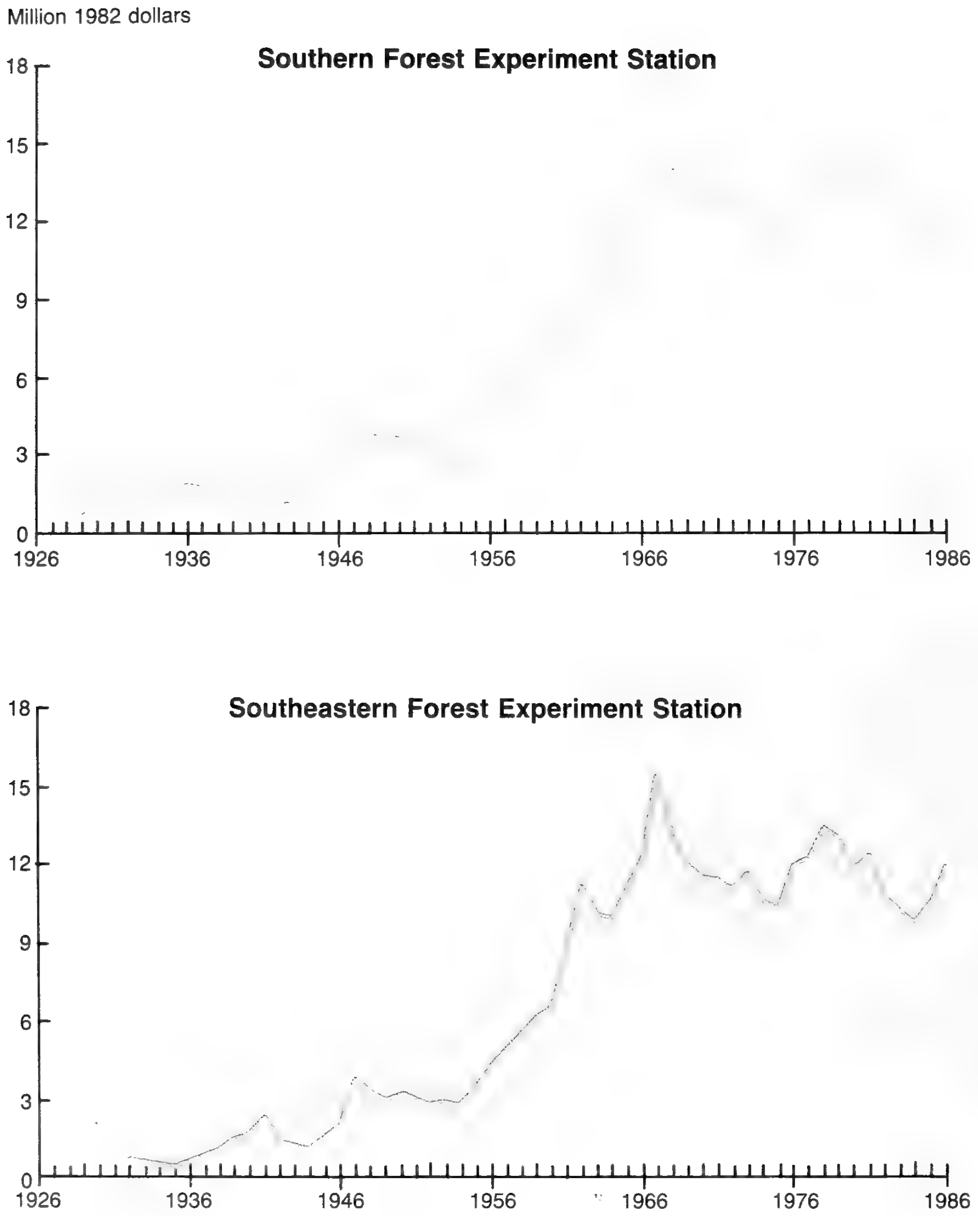


Figure 2.6—Federal funds allocated for research to Forest Experiment Stations in the South, 1929–86

Timber Management Research

Timber management research has accounted for the largest expenditures of Federal research funds at the southern experiment stations; these averaged about $8.2 million a year (1982 dollars) in the period 1977–86, or about one-third of the Federal research funding provided to the stations. Classifications of research by categories such as timber management are only approximate, however, for a given research project may include studies on multiple aspects of forestry.

The research in timber management has been concerned with such problems as forest regeneration, genetic improvement of forest trees, basic plant physiology, nutrient cycling, cultural practices such as control of unwanted vegetation by chemicals and prescribed burning, fertilization, thinning, pruning, and effects of timber harvesting methods.

Early timber management studies at the Crossett Experimental Forest in Arkansas, for example, demonstrated techniques and the economic feasibility of managing the young pine stands that were naturally regenerating on cutover and idle cropland and pasture in the South. Studies at Crossett and other experimental forests established by the Forest Service and universities over the South showed impressive rates of growth in volunteer stands of young pine timber. Undoubtedly these findings gave strong impetus to both industrial forestry programs and efforts to assist other private owners, the ownership class that continues to hold most of the timberland in the South.

Growth and yield tables developed by the Forest Service and university researchers for both natural stands and managed plantations have provided essential data for analysis of management alternatives and investments in timber growing. Other projects have developed practical methods of controlling undesirable vegetation by the use of herbicides and prescribed fire. Studies of the silvicultural effects of different timber-cutting methods have led to management guides for various forest types and owner objectives.

Although management for pine timber has been primary in southern forestry programs, studies to guide management of hardwoods have also been important in many parts of the South. Hardwood types cover more than half the total timberland and produce valuable wood products as well as providing habitat for wildlife and sites for outdoor recreation. Guidelines for regeneration and culture of various hardwood species have, therefore, been developed to aid forest managers, particularly for production of valuable species of bottomland hardwoods.

Early research studies at the Crossett Experimental Forest in Arkansas demonstrated the techniques and economic feasibility of managing young pine stands that were regenerating on cutover lands in the South. This research gave strong impetus to both forest industry management programs and the efforts to assist the other private timber owners, who hold most of the timberland in the South.

Inventory and Economics Research

Another early project conducted by the southern experiment stations was the forest survey, which provided information on timber inventories, growth, mortality, and timber cut. Initial surveys of timber resources in the early 1930's revealed that in spite of widespread timber depletion, recurrent wildfires and widespread grazing of cutover lands, enough young-growth forests had regenerated to support a sizable pulp and paper industry. Subsequent reinventories at roughly 8- to 10-year intervals have provided a continuing data base for guiding investments by the pulp, lumber, veneer, and other southern forest industries—as well as for analyses of the timber situation and outlook such as presented in this study of the southern timber situation.

Federal funding available for renewable resources evaluation in the 1977–86 period averaged about $3.5 million per year (1982 dollars), or 14 percent of the total research funds available to the Forest Service's southern experiment stations in this period (app. tables 2.16 and 2.17). Many contributions in the form of funds and manpower also were received from State agencies and the forest industries to accelerate and intensify the timber inventory process and timber evaluations.

In the early 1930's, the Forest Survey—research conducted by the USDA Forest Service to develop accurate information on timber inventories, growth, mortality, and cut— showed that there were large volumes of timber in the second forest that had regenerated on the cutover and idle cropland and pasture in the South. This information was critical in the investment decisions that led to the rapid expansion of the southern pulp and paper industry.

Investigations in forest economics were also undertaken to analyze the costs and returns of growing timber over time, problems of forest ownership, logging and plant operations, and tax policies of different levels of government. Researchers at the southern stations also studied the influence of forests on soil erosion, runoff, and watershed improvement, very important concerns in many parts of the South.

Insect and Disease Research

Research has likewise been significant in the control of southern forest diseases and insects. Early work by H.H. Chapman of Yale University during the 1920's and subsequent studies by other southern researchers demonstrated that brownspot needle disease in longleaf pine stands can be controlled through prescribed burning during seedling stages of tree development. Studies of fusiform rust indicated that the best way of dealing with this disease is by careful genetic selection of seed from resistant trees. Studies of annosus root rot discovered effective means of controlling the spread of that fungus. Practical methods were developed for minimizing losses of nursery stock to root diseases. Guides were developed for protecting wood products from termites, powderpost beetles, and other wood-destroying insects and fungi. Development of improved techniques to protect wood products against rot through use of preservatives has greatly improved wood performance and benefits to consumers, as well as reducing demands on timber resources by extending the useful life of wood products such as railroad ties, poles, and piling.

Tree genetics research by the Tennessee Valley Authority and the Forest Service got underway in the late 1930's. After World War II, industry and university scientists continued to experiment to find disease- and pest-resistant strains of fast-growing species. The creation of the Southern Institute of Forest Genetics in 1954 at Gulfport, MS, established tree genetics as a continuing research program in the South.

Funding for research on forest insects and diseases averaged about $5 million per year (1982 dollars) at the southern experiment stations in 1977–86, or 20 percent of total research expenditures.

Fire-Related Research

Research in protecting forests against fire, conducted since World War II mainly at the Southeastern Forest Experiment

Station, has involved about $1.5 million per year (1982 dollars) between 1977 and 1986, or 6 percent of total research funds available to the southern stations. Fire research has helped in developing fire-danger rating systems that have been of much practical value in fire control programs. Scientists at a regional fire research center in Macon, GA, have improved techniques for effective use of aircraft in dropping fire retardants. Measures have been developed for limiting smoke impacts from prescribed fire. Other studies have concluded that personal contact is most effective in communicating fire prevention messages.

Forest Products and Utilization Research

Research in utilization of forest products has also been important at the southern experiment stations, particularly in the last 20 years.

Funding during the 1977–86 period averaged nearly $2.3 million yearly (1982 dollars), or 9 percent of the Forest Service's research funds allocated to the southern stations. Of special importance was a program of studies on southern pines conducted at the Southern Forest Products Laboratory at Alexandria, LA, and research at Athens, GA, conducted in cooperation with the University of Georgia. This research also has included forest engineering studies aimed at improving efficiency in logging.

The Forest Products Laboratory of the USDA Forest Service, established in Madison, WI, in 1910, has conducted a comprehensive program of forest products research having numerous applications in the South. Roughly a third of the laboratory's funding has been used for utilization studies of southern forests. Of special note are investigations of pulping of southern hardwoods, improvement of processes for bleaching pulp for use in printing papers, improvements in technology in lumber manufacturing and kiln drying, and development of technology for production of plywood and other panel products from southern timber species. This research has been an important factor in the expansion of the southern pulp and softwood plywood industries.

Other Research

Other forestry research programs of the Forest Service include studies of the management of forest and related range lands for livestock, recreation, wildlife and watershed protection; economic aspects of renewable resources management and uses; and insect and disease surveys. About $3.5 million per year (1982 dollars) was spent for those programs in the period 1977–86, or 14 percent of all research expenditures at the southern stations.

University Research

Forestry research at southern universities also took on major importance after World War II. For many prior years, the small forestry faculties at southern universities carried heavy loads of teaching and extension-type responsibilities and had little time for research projects. A few experimental forests were established in the 1930's by Auburn University, Duke University, North Carolina State, and Clemson College, to conduct demonstrations and empirical studies of reforestation and other practices.

The Hatch Act of 1887 had provided funding for some research of forestry and related range problems, but State organizations expressed a great deal of concern over the low level of this support. In 1952, only $130,000, or less than 1 percent of all Hatch Act funds received by State agriculture experiment stations in the South, was allocated to the study of forestry problems. State funding of forestry research was likewise limited.

In the years after World War II, some research was nevertheless carried out at southern universities, including work such as that by Coile and Schumacher at Duke University on growth and yield of southern pines. This effort also provided an outstanding example of research combined with training of graduate students. In another, more recent example, research on forest tree improvement by Bruce Zobel of North Carolina State, Ray Goddard of the University of Florida, and others developed into comprehensive cooperative programs of tree selection for seed orchards.

In 1962, the McIntire–Stennis Cooperative Forest Research Act was passed through the efforts of various State, Federal, and private association groups. This act provided greatly increased Federal funding to land-grant and other State-supported forestry schools, on a matching basis, for research on the management and utilization of forests and related rangelands, and for training of scientists in forestry and related specialties.

Funding available to southern universities increased rapidly following passage of the McIntire–Stennis Act, reaching by 1983 about $21.5 million from all sources. State appropriations in that year amounted to $10.9 million, or 51 percent of the total funds available, far exceeding the Federal–State matching fund requirements of the 1962 Act. Federal funds available through the McIntire–Stennis Act and other Federal sources totaled $6.8 million, or 31 percent of the total. Approximately $3.8 million, or 18 percent of the funds available for university research was received from the forest industries and other sources.

By 1983, research staffs at public universities in the South had reached 166 scientist person-years. The number of graduate students receiving McIntire–Stennis support also expanded rapidly, reaching more than 640 as early as 1975. With more-adequate funding of faculties and graduate students, the universities were increasingly able to qualify for special research grants and contracts as well enlarged State appropriations.

The McIntire–Stennis program also enabled universities to cooperate among themselves and with the U.S. Department of Agriculture in the planning of research programs. Universities have worked through the Association of State College and University Forest Research Organizations (ASCUFRO) and its successor, the National Association of Professional Forestry Schools and Colleges (NAPFSC).

In this expansion of university research programs, studies have been undertaken on virtually every aspect of the management and utilization of forests and related rangelands. Several large-scale cooperative tree-improvement genetics projects, for example, conducted by university–industry–State forestry organizations in North Carolina, Florida, and Texas, have shown impressive results. The 29 cooperators in the North Carolina program have planted some 3 million acres with genetically improved stock estimated to yield a 7- to 12-percent increase in cubic volume over woods-run timber.

Research on forest tree improvement has led to the development of orchards for the production of genetically improved seed. It is estimated that the trees produced from this seed will yield a 7- to 12-percent increase in cubic volume over randomly collected, woods-run seed.

The efficiency of tree nursery management has been enhanced through similar cooperative programs of research on weed control and seed selection. Other research cooperatives have demonstrated that use of fertilizers can increase tree growth and yields by as much as 30 to 40 percent over a 15- to 20-year period. Still other examples of accomplishments include data on growth and yields of plantations, hazard ratings for insect and disease infestations, guidelines for minimizing losses to fusiform rust, and computer models to aid decisionmaking in forest management. In the field of forest products, research on pulp and paper production at North Carolina State has been particularly important. Research on wood pallet design at Virginia Polytechnic Institute; on wood preservation at Mississippi State; and on timber harvesting at Virginia Polytechnic Institute, Auburn, and Mississippi State have also been significant.

Industry Research

Southern forest industries and other private organizations have likewise spent substantial funds for forestry research and development projects, although the results of much of this work have not been publicized. Nevertheless, both direct research by the forest industries and studies conducted in cooperation with State and Federal research organizations have added significantly to the pool of knowledge on forest establishment, protection, management, and utilization. Also, the related efforts of equipment manufacturing companies have led to large increases in productivity in timber harvesting and processing of woodpulp, paper and board, lumber, wood panels, and other wood products.

Research in the field of tree improvement has been of particular importance in industrial forestry research in the South. For example, in 1985 there were 24 industry members of the North Carolina State University–industry–State cooperative genetics project, and many companies were also involved in similar projects in Florida and Texas.

Just a few examples of the numerous research projects conducted by scientists who have worked in the South have been cited above and elsewhere in this report. Clearly, the great progress in southern forestry in the past half century can be attributed in part to the efforts of research scientists working in both public and private forestry organizations.

In looking at the results of research in the South, it is evident that the great progress in southern forestry and the development of the forest industries in the past half century can be attributed in part to the efforts of research scientists working in both public and private organizations.

Forestry Education and Extension

Protecting, regenerating, and managing the southern forests required trained foresters. The first southern school for foresters started in 1898 near Asheville, NC, under the direction of Carl Schenck. Over the next several decades, other schools began to offer a forestry curriculum: the University of Georgia began courses in 1906, Louisiana State University in 1924, and North Carolina State University in 1929, with Duke University and the University of Florida following in the 1930's.

The New Deal in the 1930's prompted a dramatic rise in the number of forestry students, as the Civilian Conservation Corps and other agencies hired personnel trained in conservation work. During the Second World War, professional training was limited; but after the war ended, thousands of veterans returned to the classroom, and forestry school enrollments were high for a number of years. These high enrollments stimulated the growth of new schools and new programs. Within 2 years after the war's end, Auburn University, Clemson College, Louisiana Polytechnic Institute, Mississippi State University, Oklahoma State University, the University of the South, Stephen F. Austin State University, and the Virginia Polytechnic Institute all established forestry school programs.

By 1985, there were 16 universities in the South with professional forestry education programs, including the 12 land-grant colleges and universities that have been associated with agricultural experiment stations under provisions of the Hatch Act of 1887. There were also 14 public institutions offering forestry technician training.

Since 1934, it is estimated that southern forestry departments or schools have granted more than 18,000 professional degrees in forestry. More than 11,000 of these graduates accepted forestry positions in the South, along with several thousand technicians in forestry and forest engineering. Graduates in other disciplines such as wildlife and range management, recreation, soil science, and computer technology also have been employed by both public and industrial organizations having responsibilities in land and resource management.

Role of Extension Programs

Forestry extension programs have also played an important role at land-grant universities by serving as a link between university faculties and users of information and new technology in agriculture and forestry. The Smith–Lever Act of 1914 provided for a cooperative system, including the U.S. Department of Agriculture, State land-grant colleges and universities, and county extension services, to extend results

of research to farmers and other rural people. For many years, however, efforts devoted to southern forestry were very limited.

In 1924, the Clarke–McNary Act authored Federal funding on a matching basis with States to aid farmers by providing information on management and utilization of forest resources. The act stimulated the appointment of the first full-time professional extension foresters in most of the land-grant universities of the Southern States. Although they were few in number, they had an impact, especially in fire prevention programs. In 1937, the Norris–Doxey Farm Forestry Act further strengthened extension work in forestry to be carried out through various educational programs such as demonstrations and publications.

The Norris–Doxey Act also made provision for a program of technical assistance to individual owners of farm forests. The Soil Conservation Service initially conducted this program, but in 1943 it was transferred to the Forest Service, cooperating State forestry agencies, and State extension services. In some Southern States, the State extension services were responsible for farm forestry education and such technical assistance until the Cooperative Forest Management Act of 1950 expanded the technical service role of the State forestry agencies.

Amendments to the Clarke–McNary Act and the Research and Marketing Act of 1954 provided for additional extension work with processors of forest products. Finally in 1978, the Renewable Resources Extension Act gave a specific charter for educational programs in forest and rangelands management for multiple purposes, utilization of forest products, and urban forestry. Increased Federal funding thereafter has been more than matched by State and local contributors.

For many years, most State extension services had only one to two forestry specialists, although the numbers increased over time. By 1985, there were 84 specialists in forestry and forest products conducting extension work in the South; 7 of the 12 Southern States had 5 or more of these specialists.

Extension foresters have generally operated on a State or multicounty basis through such means as field demonstrations of forestry practices, tours, conferences, newsletters, radio and television talks, and publications. Recently, investment analysis also has been provided in at least eight Southern States to aid landowners in making decisions on reforestation, management, and timber harvesting. Work with 4-H Clubs and more recently with urban owners of forest land and county landowner organizations has made up part of the forestry extension program. Forest products extension specialists have also worked directly with client firms and with groups of wood procurement foresters, private logging contractors, and lumber kiln drying operators to provide information on new technology.

Continuing Education Programs

Continuing education for foresters and related specialists through short courses, conferences, workshops, and symposia has constituted a significant part of forestry extension work in the South. These activities have included symposia on fusiform rust, the managed slash pine ecosystem, and bottomland hardwood silviculture, among other topics. Short courses have included a wide variety of topics such as aerial photogrammetry, timber inventories, use of herbicides, pulpwood harvesting, wood drying and finishing, and taxation.

Continuing education has been an important means of improving timber management by increasing the effectiveness of public foresters, consulting foresters, forestry contractors, loggers, and others working with private timberland owners. This education through short courses, conferences, workshops, and symposia has been a significant part of forestry extension work in the South.

Continuing education programs have been an indirect means of aiding private timberland owners by increasing the knowledge and effectiveness of public foresters, consulting foresters, and forestry contractors. In recent years, between 800 and 1,000 foresters have participated annually in such training, with forest industry professionals and consulting foresters the largest group in attendance.

A final activity of university and extension faculty—as in the case of members of Federal and State forestry organizations and many private associations—may be defined as public service. Faculty members, agency administrators, and other professionals contribute time and energy to the advancement of forestry itself. Many have helped in obtaining legislation for programs of fire protection and other conservation activities. Large numbers have provided technical assistance in developing public policy on forest conservation issues.

Influence of Professional Organizations and Industry

In the general area of forestry education aimed at the American public, the activities of a number of organizations have been of major importance. As cited elsewhere, the American Forestry Association has worked through publications, conferences, and testimony on legislation to advance understanding of forest conservation problems and needs. The Society of American Foresters has provided a flow of information on all aspects of forestry through such media as the Journal of Forestry, Forest Science, and the Southern Journal of Applied Forestry.

Other journals such as the Forest Farmer, Southern Lumberman, and the publications of State extension services, forestry commissions, and departments and the Forest Service have helped carry conservation messages to all parts of the South. Cooperative efforts such as the Smokey Bear and Woodsy Owl programs have helped educate the public on fire protection and pollution control.

Forest industries likewise have established both association and company programs, such as the Keep Green and Tree Farm Programs, to publicize the need for forest protection and management. Following establishment of the first tree farm in Washington State by the Weyerhaeuser Company in 1941, the concept quickly spread in popularity throughout the South. Growing trees as a crop was not new in the 1940's, but certifying landowners who demonstrated good forestry provided recognition and a stimulus to better forest management.

Technical Assistance in Forest Management and Utilization

Gifford Pinchot proposed a Federal program to assist forest owners in the management of timberlands as early as 1898. Shortly after he took office as chief of the Division of Forestry, Circular 21, "Practical Assistance to Farmers, Lumbermen, and Other Owners of Forest Land," was issued, beginning the first of many efforts in Federal cooperative forestry.

For many years, the number of foresters offering technical assistance to timberland owners and operators was very limited. In 1937, the Norris–Doxey Cooperative Farm Forestry Act provided some Federal funding and direct technical assistance for individual farm woodland owners as well as for extension education. During World War II, the Forest Service also established a forest utilization service at forest experiment stations to help improve sawmill operations, assist in locating timber for special needs, and otherwise help in the war effort.

The Cooperative Forest Management Act of 1950 greatly strengthened the technical forestry assistance programs conducted by State forestry organizations and the Forest Service. The authorization was increased to $20 million per year, with Federal funding to be matched by State contributions. In addition, the act broadened the program to include all private landowners, forest operators, wood processors, and public agencies involved in multiple-use management of forest lands, utilization of forest products, and urban forestry. Finally in 1978, the Cooperative Forest Assistance Act clarified the scope of the various Federal–State cooperative forestry efforts and established new authorizations for Federal cooperative funding.

Federal funds available for cooperative forest-management assistance in the South increased considerably over the years, from about $1 million per year (1982 dollars) in the early 1950's to a peak of $5.9 million in 1981 (fig. 2.7 and app. table 2.18). Subsequently, Federal contributions fell to only $1.4 million in 1985. State contributions to this cooperative program have exceeded Federal funding by increasing amounts. State funds rose from about $1.6 million (1982 dollars) per year in the early 1950's to nearly $25 million in 1984.

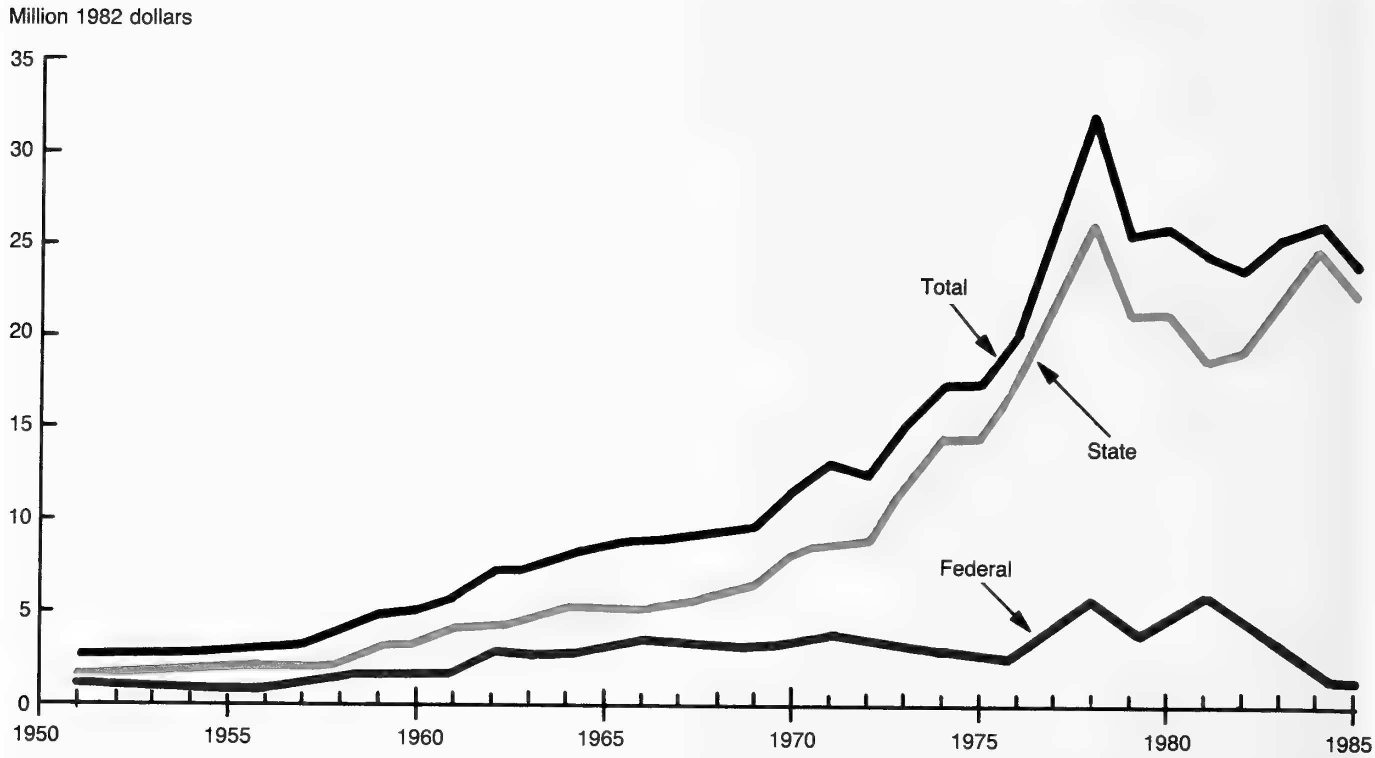


Figure 2.7—Federal and State expenditures for forest management assistance in the South, 1951–85. Forest management assistance includes Cooperative Forest Management and Rural Forestry Assistance

Role of State Service Foresters

Carrying out cooperative forest management programs of technical and financial assistance has required the development of a professional corps of foresters in the State, Federal, and private sectors. For example, in 1985 there were some 481 State professional "service foresters" employed in these programs in the South (app. table 2.15).

Assistance to landowners and other groups has included such tasks as developing forest plans; marking timber for cutting; advising on practices to enhance timber growth and quality, such as release, thinning, fertilizing, and prescribed burning; and advising on timber sales, logging practices, and processing of forest products. State service foresters generally provide a limited amount of assistance per owner per year, mainly to small owners who might not be able to afford consultants or qualify for industry-supported programs.

State and Federal foresters also have worked with the Soil Conservation Service in planning and conducting certain forestry activities under the Watershed Protection and Flood Control Act of 1954. The Soil Conservation Service and Soil Conservation Districts have furnished some technical assistance in forestry in connection with farm planning and other conservation programs.

Forest Industry Assistance

Many companies in the forest industries have also provided technical assistance to private timberland owners. As early as 1939, the International Paper Company designated a number of its field personnel to help other private owners in timber management and marketing. Most of the technical assistance came from pulp and paper companies and industrial groups such as the Southern Pulpwood Conservation Association, now part of the American Forest Council.

Such industry assistance programs have ranged from a few services to almost total management of land and timber under more or less formal "Tree Farm Family" arrangements. Land enrolled in industrial management assistance programs in the South in 1984 totaled some 4.2 million acres.

Consulting Foresters

In addition to public and industry programs, technical forestry assistance has also been offered by many private consultants. Consulting forestry services available to private landowners have increased greatly in the last 20 years, and it is estimated that there are over 1,900 consulting foresters in the United States. In Georgia alone, more than 100 consultants are reported to be providing such technical assistance.

Forestry consultants provide services for a fee, including assistance in timber estimating and marking, land surveying, timber and land sales negotiations, and many other forestry practices considered inappropriate for public support. Although good estimates of the total area serviced by consulting foresters do not exist, it is substantial. For example, according to a recent study in Georgia in 1983, 3,900 landowners received management plan assistance from consultants, for properties with a total area of 779,000 acres (Cubbage and Hodges 1986). Consultants also marked 279,000 board feet of timber and 485,600 cords of pulpwood and helped in the artificial or natural regeneration of 61,400 acres of land in other private ownerships.

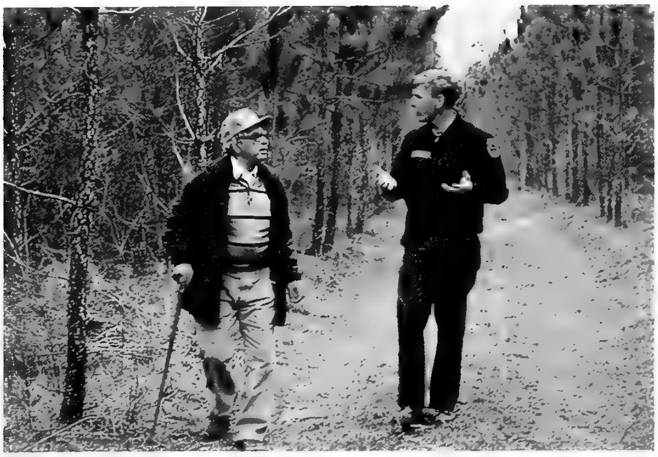
Cubbage and Hodges also estimated the total levels of assistance in Georgia in 1983. The total level of accomplishments and average tract size varied significantly among industry, consulting, and State forestry programs. Consultants marked more timber than industry and State foresters and generally provided more services and more-detailed management plans. Industry programs assisted considerably fewer owners, but these ownerships were relatively large, averaging 636 acres. The average tract size serviced by State foresters was 131 acres; for consultants it was 376 acres. Georgia State foresters assisted the most landowners, but most of the assistance consisted of brief plans that did not require intensive site examinations. Georgia's State service foresters marked less than 1 percent of the timber harvested in the State, compared with about 8 or 9 percent marked by consultants.

Effectiveness of Assistance Programs

These public and private programs of technical forestry assistance, along with other educational and cost-sharing programs, have undoubtedly stimulated efforts to increase timber resources, although data are not available to show the full extent of such effects. Some recent estimates, though of uncertain accuracy, show significant acreages of timberland receiving intermediate stand treatments, such as release and weeding of stands, precommercial thinning, pruning, fertilizing, and prescribed burning for control of understory vegetation. In the 1970's, areas so treated varied between roughly 400,000 and 700,000 acres per year (app. tables 2.19–2.21). In the period 1982–84, such treatments had increased to more than a million acres per year. About two-thirds of this stand improvement work in recent years has been on forest industry and certain corporate ownerships, such as railroad and utility companies. A significant part of the total, however, was on lands of other private owners, who received technical and/or financial assistance from public programs.

A number of investigations have been conducted to evaluate the efficiency and effectiveness of technical assistance and cost-sharing programs. In general, these studies have shown that the programs are efficient—the benefits exceed the costs—and that they are effective in improving forest management and/or increasing the income of timberland owners. A study in the Georgia Piedmont evaluated the effects of technical forestry assistance by comparing the experiences of assisted and nonassisted landowners who made timber harvests (Cubbage and others 1985). This study showed that harvests differed significantly between the assisted and nonassisted landowners. Timberland owners assisted by State foresters generally had less pine timber removed (1,135 vs. 1,485 cubic feet per acre), had more softwood volume left after harvest (810 vs. 226 cubic feet per acre), and had more pine seedlings (1,602 vs. 803 per acre) after natural-stand harvests.

Harvest returns also differed significantly. Owners assisted by State service foresters received an average price of $108 per thousand board feet of timber; those making their own sales averaged only $66 per thousand board feet. A small amount of this difference could be explained by differing product distributions; but even in the most conservative case, assisted landowners received stumpage prices 58 percent greater than landowners making their sales without assistance. Greater returns from sales and greater residual volumes also led to a greater total net present value per acre on lands whose owners received assistance ($1,563), compared to the nonassisted group ($940), at a real discount rate of 4 percent.



Public and private programs of technical forestry assistance to private timberland owners, along with other educational and cost-sharing efforts, have been efficient—the benefits exceed the cost—and effective in improving forest management and increasing the income of timber owners.

A study of the Southwide effects of professional foresters on pine regeneration revealed that owners made regeneration investments on 63 percent of their acres when they had consulted a forester (Royer and Kaiser 1985). Regeneration investments were made on only 12 percent of the acres, if foresters were not involved.

In another study Royer (1987) looked at the effects of markets and public programs on reforestation decisions by landowners. He found that 60 percent of the variation in decisions could be explained by program influences, particularly cost-share funds and technical assistance; 16 percent could be explained by ownership and personal characteristics; another 13 percent could be explained by market forces; and factors influencing the remaining 11 percent could not be explained.

A study of the Forestry Incentives Program showed that investments in tree planting and stand improvement in 1974 had an average annual financial return of 10.2 percent (Mills and Cain 1979). However, many small tracts that were treated were unlikely to yield satisfactory returns; and returns from timber stand improvement in oak–hickory stand types were typically low. A later analysis of the 1979 program found that the average size of treated areas had increased considerably, and practices on lower site-quality lands had been curtailed (Risbrudt and Ellefson 1983). Researchers concluded that the 1979 program would result in an additional 1.3 billion cubic feet of timber over the first rotation compared to the timber that would have been produced without the program. Ninety-three percent of the additional volume was in softwoods.

In summation, it seems clear that technical and financial assistance, whether public or private, has been an effective and increasingly important influence on the regeneration and management of timberlands in other private ownerships in the South.

Insect and Disease Control

In the years after World War II, action was also taken to control the more destructive insects and diseases that had long caused heavy losses of forest trees in the South. Bark beetles are endemic to southern forests, and periodic serious outbreaks as in recent years have resulted in heavy losses of timber. Seed and cone insects limit seed production and complicate regeneration programs. Diseases in tree nurseries, rots in damaged trees, the littleleaf disease of loblolly and shortleaf pines, brownspot disease of longleaf pine, and fusiform rust in slash and loblolly pine stands also seriously limit timber growth and yields.

Insect and disease control has been effective in nurseries. Without such control, it would be impossible to produce the billions of tree seedlings needed each year for planting.

The availability of new pesticides and herbicides during the 1940's shifted the emphasis toward direct treatment by chemical agents. While herbicides and pesticides were never as widely used by foresters as by farmers, these agents saw increasing service to control forest pathogens and suppress unwanted vegetation. Because of recent environmental concerns, however, there is increasing emphasis on the use of biological and cultural controls instead of chemicals.

Federal funding for control of forest insects and diseases was provided by the Forest Pest Control Act of 1947, administered since 1954 by the Forest Service. Federal expenditures in the South for insect and disease control increased moderately, from an average of $3.3 million (1982 dollars) in the last half of the 1960's to an average of about $5 million in the first half of the 1980's (fig. 2.8 and app. table 2.22). Expenditures by non-Federal agencies for State and private cooperation in this program have averaged about half the amount of Federal funding, rising from about $1.2 million (1982 dollars) in the late 1960's to an average of about $2.4 million in the early 1980's.

Under this control program, the Forest Service and State agencies have conducted continuing surveys to identify and evaluate outbreaks of forest insects and diseases. Control projects such as spraying or removal of trees are carried out by the Forest Service on Federal lands and by the Forest Service in cooperation with State forestry organizations on private lands. The State forest services have increasingly been called on to implement direct control methods and to coordinate the salvage of dead and dying timber on private lands, as in the fight against recent major outbreaks of the southern pine beetle.

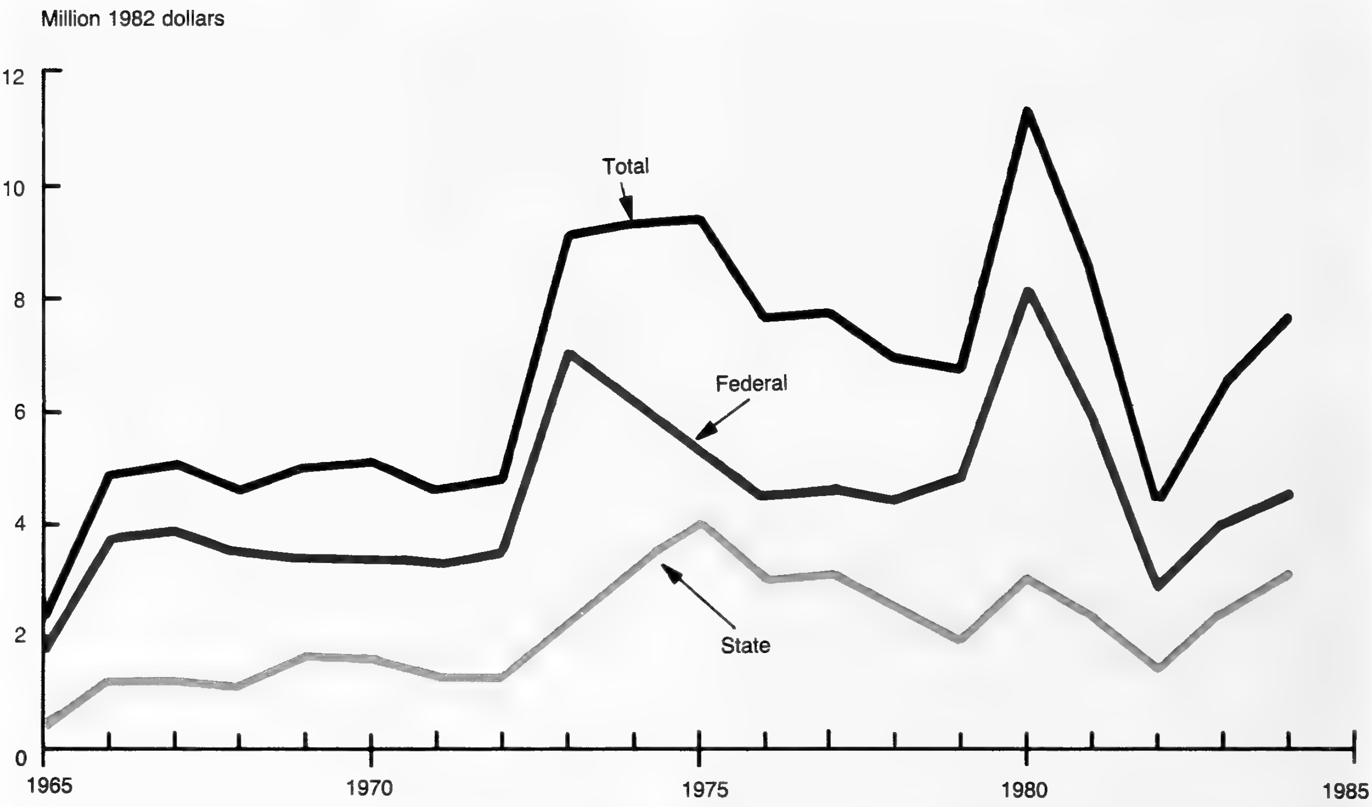


Figure 2.8—Forest Service and State expenditures for insect and disease management in the South, 1965–84

Taxation Modifications

The influence of taxes on American forests, an issue even in colonial times, became a matter of serious concern during the 1920's. The Clarke–McNary Act of 1924 called for a nationwide study of forest taxation, subsequently carried out under the title "Forest Taxation Inquiry." The major report of the study, sometimes called the Fairchild Report after its author, was published in 1935 (Fairchild and Associates 1935). In response to the tax problems described in the Fairchild and other reports, both the States and the Federal Government have developed a number of special tax laws designed to encourage forest management and timber investment.

State Forest Tax Laws

In the South, four basic kinds of special State laws relating to the taxation of forest property have been developed—exemptions, modified assessments, yield taxes, and severance taxes. Exemption laws remove forest land and/or timber from property tax rolls permanently or for a specified number of years. Modified assessment laws provide a reduced tax rate or a different valuation standard for forest properties. For example, forest property may be valued by a "current use" standard rather than fair market value at "highest and best use." Under yield tax laws, forest land is subject to the normal or modified annual property tax, but timber values are untaxed until harvest. At that time, a tax based on some percentage of the stumpage value is imposed. Severance taxes, also imposed at the time of harvest, are customarily based on a fixed amount per unit of product harvested rather than a percentage of value and are assessed against the timber operators. The time of passage and extent of usage of these laws by State is shown in figure 2.9.

Federal Taxes on Timber

In the case of Federal taxes, the 1943 Revenue Act and Section 631 of the Internal Revenue Code allowed income from both timber sales or use by owners to be treated as capital gains, with lower tax rates than applied to ordinary income. A further amendment to the Code in 1980 allowed taxpayers to amortize over 8 years the first $10,000 of expenditures for reforestation, together with a tax credit equal to 10 percent of the first $10,000 of such costs.

The 1986 Federal Tax Reform Act changed the capital gains provision in the Internal Revenue Code in several respects, including a change in the capital gains tax rates to equal the rate on ordinary income. However, it retained the amortization and tax credit for reforestation and the expensing of annual management costs. The major timber-related provisions of current Federal income tax law are summarized in appendix table 2.23.

There is very little quantitative data on the impacts of the special State and Federal tax laws on timber resources and timber supplies. However, they have generally reduced management costs and provided incentives for investments in forest management programs. In addition, in many Southern States some of the revenues from special forest taxes, and particularly that from severance taxes, have been used to directly support tree planting and other forestry programs.

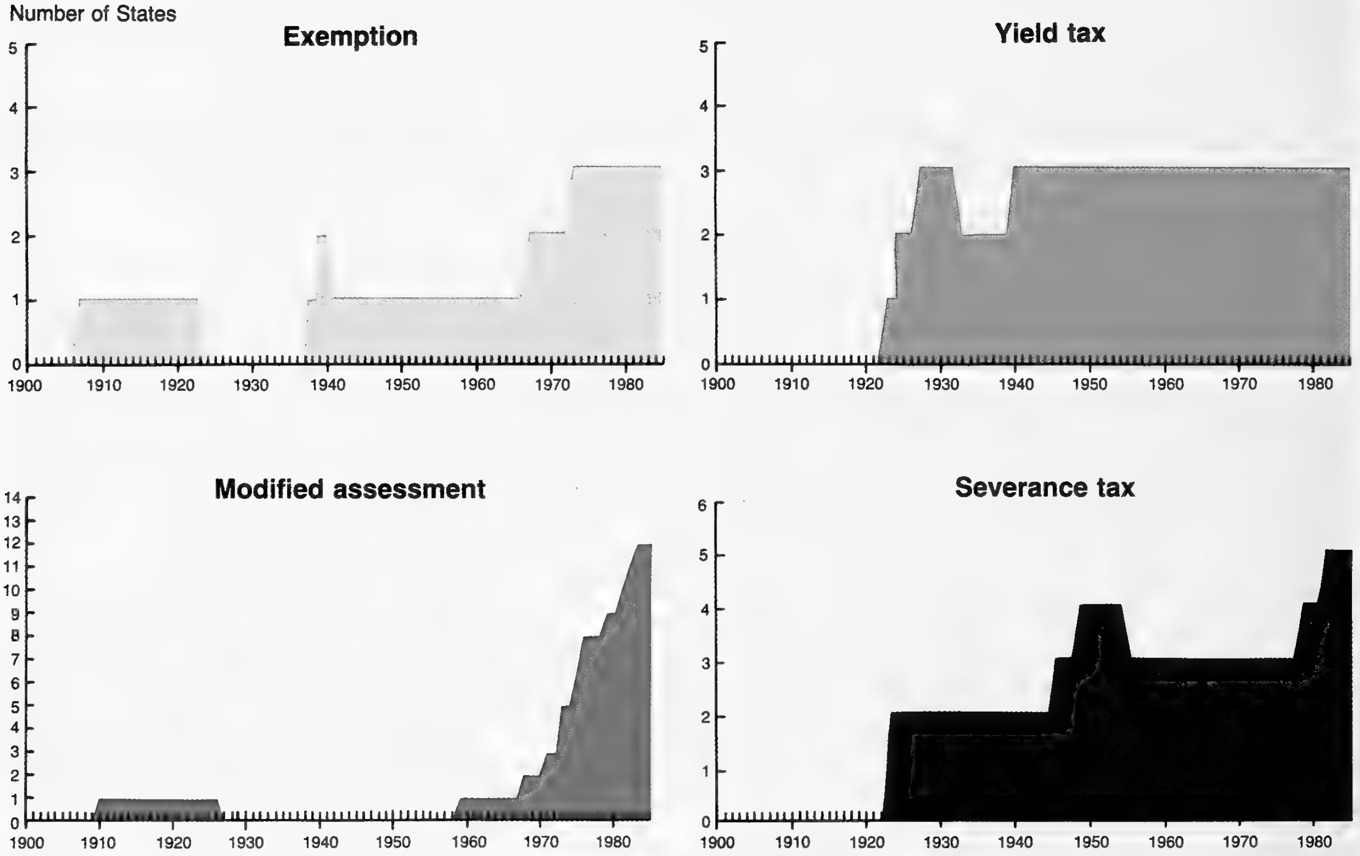
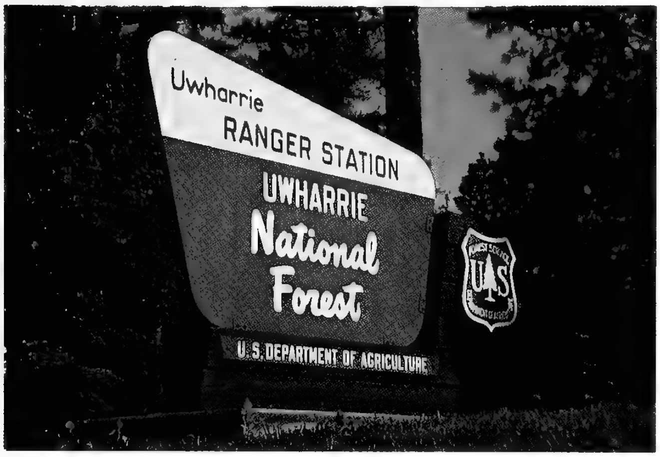


Figure 2.9—Number of States with special forest tax laws in the South, by type of tax, 1900–85

National Forest and Other Public Land Management

Most timberlands in the South have long been privately owned by a wide variety of people and agencies, and the forestry programs described in this chapter have consequently been largely aimed at these ownerships. National forests and other public holdings contain only 10 percent of the total area of timberland in the South; nevertheless, they have played a significant role in watershed protection, the development of forest fire protection, rehabilitation of cutover and eroded lands, demonstration of forestry opportunities, furnishing sites for outdoor recreation, and providing habitat for wildlife including endangered species.

The first southern forest lands to come into Forest Service hands were limited areas of public domain in Arkansas and Florida that were reserved as national forests in the period 1907–13. Essentially, these consisted of unpatented public lands of low site quality. With passage of the Weeks Act of 1911, lands were also purchased for national forests in the headwaters of navigable streams, for watershed protection. In addition, these lands provided demonstration areas, where private owners could see forest practices in action—techniques they could use to protect and better manage their own lands. The Clarke–McNary Act of 1924 authorized the acquisition of land for national forests for timber production as well as for watershed protection.



The national forests in the South contain only 10 percent of the timberland area. Nonetheless, they have played an important role in developing forest fire protection, rehabilitating cutover and eroded lands, demonstrating forestry opportunities, furnishing sites for outdoor recreation, and providing habitat for wildlife, including endangered species.

Very little land was acquired for some years under these authorizations, but with the onset of the Depression, Congress empowered the Forest Service to undertake a major acquisition program in the South, as well as in other regions. Much of the extensive cutover area in the South was tax delinquent, and many States and private owners welcomed the opportunity to sell land to the Federal Government. During the New Deal and subsequent years, some 35 national forest units, administered by 15 forest supervisors, were established in the South. By 1985, they included 10.8 million acres of timberland, or 6 percent of the total timberland in the South.

Under the Bankhead–Jones Farm Tenant Act of 1937, the Resettlement Administration acquired sizable areas of worn-out farmland in the Southern States in order to assist farmers in relocating to better jobs. Initially these lands were managed by the Soil Conservation Service, but in 1950 some acreage was added to the national forests. Other parts of this land were transferred to the U.S. Fish and Wildlife Service for refuges, and more than 300,000 acres were transferred to State agencies for management as parks or forests.

Much of the land acquired by the Federal Government for national forests was obtained from timber and land-holding companies after logging. Some purchases were from other private owners of large or small tracts of cutover forests or idle and eroding cropland and pasture. Federal acquisitions were typically mixed with private holdings. Most areas had also been repeatedly burned by wildfires and were either nonstocked or poorly stocked with timber-quality trees.

For many years, management of these national forests was mainly custodial, with fire control of primary importance. Construction of roads and trails, campgrounds, and other facilities also opened up the forests for recreation and other public uses. In the 1930's, the Civilian Conservation Corps contributed in a major way to rehabilitation of some of these lands by stand improvement work, planting of nonstocked areas such as idle and eroding cropland and pasture, and protection of forests from fire. The Civilian Conservation Corps work was the first effort to replant significant acreage in trees.

The trends in regeneration on the national forests in the South are shown in appendix table 2.24. During the 1930's and early 1940's, when the Civilian Conservation Corps was active, substantial acreages were regenerated. Regeneration surged again in the mid-1950's, reaching 129,000 acres in 1957. In most years since then, it has fluctuated between 50,000 and 100,000 acres a year. The largest part of the regeneration has been in the South Central States.

Trends in stand improvement—intermediate stand treatments such as prescribed burning and thinning to increase timber growth and/or timber quality—on the national forests are also shown in appendix table 2.24. In 1951, the first year for which data are available, some 158,000 acres were treated. This figure increased to nearly 400,000 acres in 1959 but has since declined to below 100,000 acres a year.

In response to management, the national forests in the South have gradually become more productive. The volume of timber cut, for example, has increased from 45 million board feet in 1923 to 1.4 billion in fiscal year 1985 (fig. 2.10, app. tables 2.25 and 2.26). The value of the timber has followed similar trends. The peak came in fiscal year 1984, when it totaled $104 million. Most of the timber cut since harvesting began has come from the national forests in the South Central region.

In the last few decades, a series of legislative acts has significantly affected the management and use of the national forests in the South. For example, the Multiple Use and Sustained Yield Act of 1960 required that the national forests be managed for outdoor recreation, range, timber, watershed, and wildlife and fish purposes.

National forests had long been managed under multiple-use guidelines, but coordination between timber management, wildlife, recreation, and grazing interests became increasingly difficult. In the 1960's, for example, increasing conflicts led to litigation over clearcutting on the Monongahela National Forest, and new legislation. The National Environmental Policy Act of 1969 required the Forest Service (and all other Federal agencies) to assess and document the environmental impacts of their decisions. The National Forest Management Act of 1976 provided new guidelines for land management and use, including the requirement that the Forest Service prepare detailed management plans for each national forest every 10 to 15 years. These laws afforded the public increased opportunities to participate in management decisions.

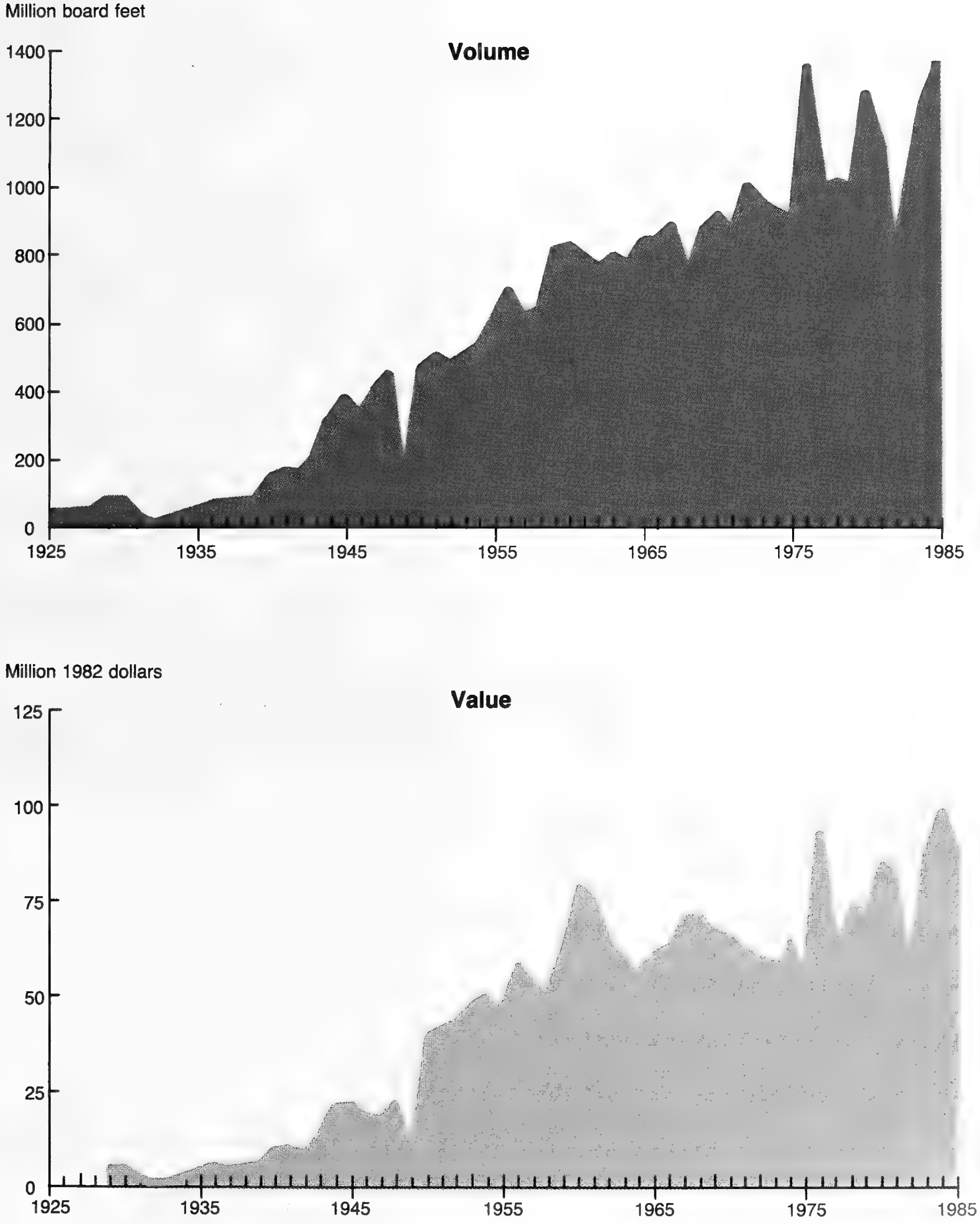


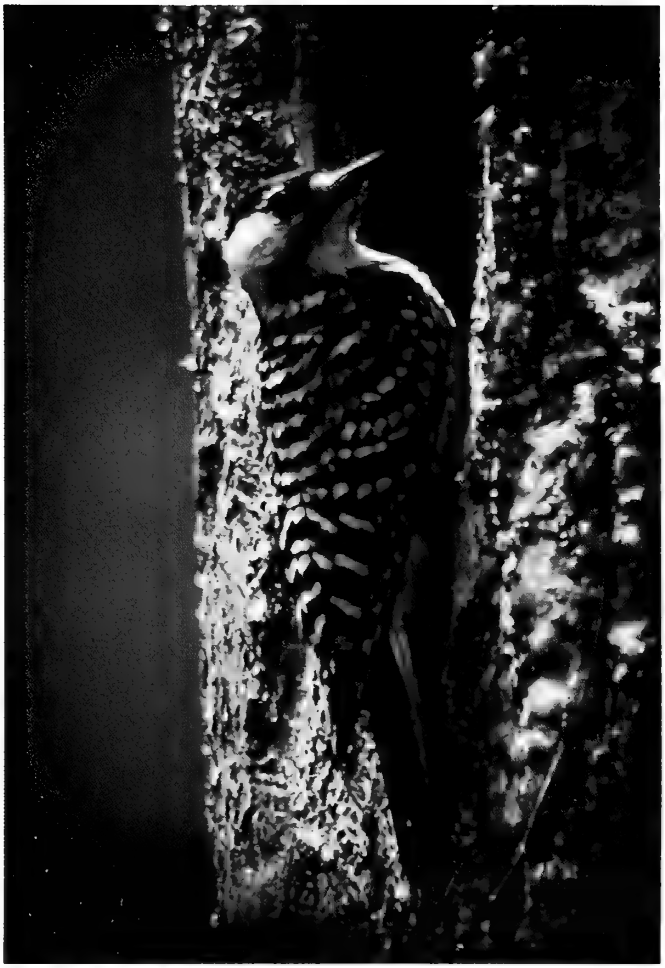
Figure 2.10—Volume and value of timber cut from National Forest System lands in the South, 1925–85

The Endangered Species Act of 1973 provided for the conservation of endangered or threatened species and the ecosystems on which those species depend. Of the several endangered or threatened plant and animal species found on the southern national forests, the red-cockaded woodpecker has created the greatest challenge in timber management planning. Some 250,000 acres of mature southern pine timber in the southern national forests are being managed for the red-cockaded woodpecker. As recovery of this species progresses, more acres are likely to be affected.

On January 3, 1975, the "Eastern Wilderness Act" created 115,000 acres of designated wilderness from national forest lands in the southern region. Subsequent legislation increased this area to 523,000 acres.

In addition to the national forests, there are substantial areas of timberland in other public ownerships in the South. In 1985, these other public timberlands comprised some 7.2 million acres. Federal lands other than national forests primarily include holdings of the Tennessee Valley Authority and military reservations. Timberlands in State and county holdings in the South cover less than a half million acres.

Following establishment of the Tennessee Valley Authority in 1933, this Federal agency acquired and administered roughly a half million acres of timberlands for protection of watersheds and dams, recreation, and production of timber. The Tennessee Valley Authority also has carried out sizable programs of planting on Federal, State, and private lands; furnished assistance to State and private forest owners in protecting forest lands in the Tennessee River Valley from fire and grazing; and conducted a program of forestry research.



The Endangered Species Act of 1973 provided for the conservation of endangered and threatened species and the ecosystems on which those species depend. Of the several endangered or threatened plant and animal species found on the southern national forests, one species, the red-cockaded woodpecker, has had the greatest impact on timber resources.

Expansion of the Forest Industries and Industrial Forestry

With development of forestry programs and the regeneration of the second and third forests, the South has witnessed spectacular growth in the southern pulp and paper industry, together with a resurgence of the lumber industry and establishment of new southern pine plywood and other panel board industries.

With the development of forestry programs and the regeneration of the second and third forests, the South experienced spectacular growth in the pulp and paper industry. Mills in the South now produce about 70 percent of the Nation's woodpulp.

The Pulp and Paper Industry

Small amounts of woodpulp were produced in the South as early as 1909, when the Roanoke Rapids Pulp Manufacturing Company made sulfite pulp for wrapping and other papers. In the following years, markets for pulp and paper products in the United States continued to expand steadily. Major improvements in technology of using southern pines and the sulfate process for pulp flowed from the work of investigators in the pulp industry and the Forest Service's Forest Products Laboratory. In addition, the first forest survey in the South in the early 1930's showed that large supplies of pulpwood could be obtained from the second forest of the region.

These factors, along with favorable conditions for water, power, labor, and transportation, made possible a major expansion of the southern pulp and paper industry to a point where the South soon became the regional leader of this industry in the United States. By 1930 there were 15 southern pulp mills; in 1985 there were 108. Pulp production in the South increased from about 781,000 tons in 1930 to some 38.6 million tons in 1984 (fig. 2.11 and app. table 2.27)—about 70 percent of U.S. production in the latter year.

Markets for pulp and paper products produced in the South have been especially strong for container board and a variety of other brown papers. Research in production of newsprint from southern pines, particularly studies conducted by C.H. Herty, also led to construction of a number of mills to produce newsprint from southern pines. In recent years, southern mills have been producing increasing amounts of bleached pulps for use in printing papers.

Pine pulpwood has been the primary material used in southern pulp mills, but the industry has also used increasing amounts of hardwoods in such products as the corrugating medium of container board and in printing papers and rayon. Development of a semichemical process and a high-yield cold soda process through research at the Forest Products Laboratory have made the methods for pulping hardwoods more efficient. By 1984, use of hardwoods had risen to some 31 percent of the round pulpwood harvested in the South (app. table 1.2).

Among other technical developments was the introduction of sawlog debarkers that made possible the production from slabs and edgings of clean chips usable by pulp mills. Production of millions of tons of pulp chips from this otherwise waste material was equivalent to adding millions of acres of timberland to the resource base.

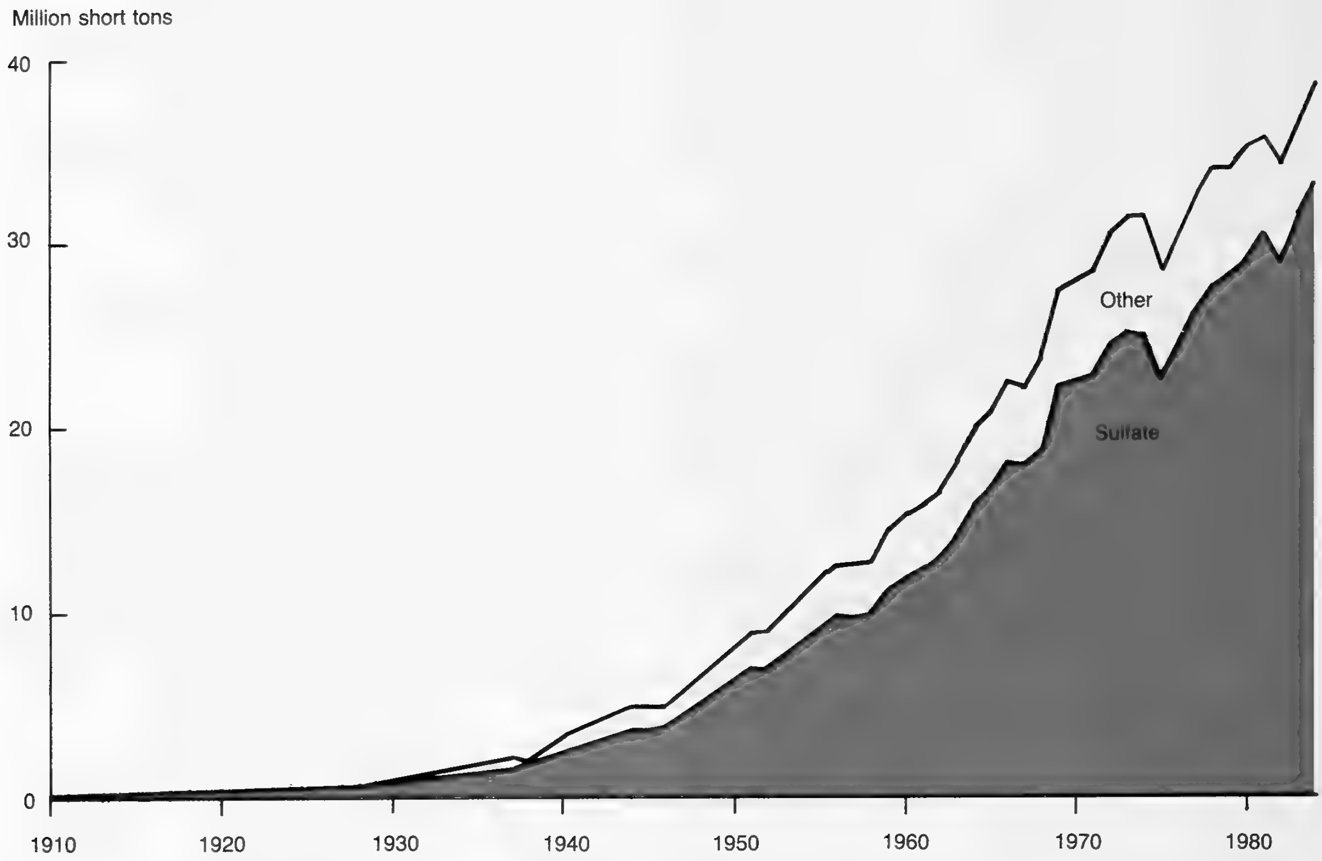


Figure 2.11—Woodpulp production in the South, by type, 1910–84

Timber Sources for the Forest Industries

When the southern pulp and paper industry began its rapid expansion in the 1930's, it also undertook a major land acquisition program to assure adequate pulpwood supplies. Timberlands were acquired from long-term owners in the lumber industry, from land companies, and from various other private owners. Some forest products companies in the South continued to operate with little or no timberland base, and in the 1980's, some sizable properties have been offered for sale. Other companies, nevertheless, have continued to add to their holdings, especially when available timberlands were located close to existing plants.

The forest industries also have leased substantial areas of timberlands from other private owners to supplement wood supplies obtained from company holdings and the open market. In 1985, for example, about 4 million acres were under lease to forest industries. These leases usually involve some annual payment to the landowners and management controls by the leasing company.

Total timberland area in forest industry ownership in the South has increased from 33.4 million acres in 1952 to 42.3 million acres in 1985, including timberlands leased or under management contracts (app. tables 3.1 and 3.2). These industry lands in 1985 represented 23 percent of the total area of timberland in the South.

With the ownership and leasing of more than 42 million acres of timberland, the southern forest industries have been able to obtain increasing volumes of pulpwood, sawlogs, and other products from company lands. In 1984, softwood timber harvests on forest industry lands reached 1.8 billion

cubic feet—nearly two and a half times the cut from company lands in 1952 (app. tables 3.21 and 3.22). In the case of hardwoods, forest industry lands in 1984 provided 534 million cubic feet—about 1.7 times the cut from company lands in 1952 (app. tables 3.49 and 3.50).

Although the southern forest industries have thus significantly increased timber harvests on company lands, most firms still rely primarily on other private owners, who hold about 67 percent of all timberlands in the region, for the bulk of the wood required for plant operations. In 1984, other private ownerships supplied 2.9 billion cubic of softwood roundwood and 1.8 billion cubic feet of hardwood roundwood, close to 60 percent of total softwood roundwood supplies and over 70 percent of total hardwood roundwood supplies.

In recognition of the continuing need for wood supplies from the other private ownerships, the southern forest industries have supported Federal and State efforts to assist private timberland owners and have carried out special industry programs in forest establishment and management.

Owners in the other private class hold timberlands for a wide variety of reasons. Some engage in farming, holding forests as an incidental part of farm operations, and may or may not be interested in improving forest management. Mining companies, public utilities, and other corporations hold land for specialized business purposes. Numerous individuals have acquired land by purchase or inheritance and use their timberlands primarily for hunting, other recreation, or uses in lieu of or in addition to timber production.

For various reasons, most of these other private timberland owners have been reluctant to invest significant amounts of capital in reforestation or other management practices. Both State and Federal legislatures and the forest industries consequently have adopted a variety of forestry programs as the only practical way to assure an increasing flow of timber and related economic and social benefits from these southern forests.

Industrial Foresters

Many industrial foresters were hired to carry out intensive management programs on forest industry lands, including prevention and control of wildfires, prescribed burning, establishment of extensive pine plantations, stand improvement, and timber harvesting. By 1940, southern forest industries were employing an estimated 220 trained foresters. By 1953, more than 750 professionally trained foresters were at work on industry lands, and by 1976, this number had increased to more than 2,200. The International Paper Company alone employed more than 500 foresters between 1940 and 1970 and other forestry technicians in programs of land management, assistance to other landowners, and research.

Some industry foresters were assigned to work directly with timberland owners in the other private class in providing assistance in forest management. Typically, company foresters first consult with timberland owners on their land-use goals and next develop forest management plans and furnish timber marking services and overviews of silvicultural operations. These services are provided in exchange for the right of first refusal to purchase timber at the time of harvest or some other consideration.

Forestry Associations

In addition to the efforts of individual companies to improve forest protection, management, and utilization, the forest industries have also worked through a number of associations or other groups. Thus the Southern Pulpwood Conservation Association (SPCA) was organized in 1939 to advance educational and forest assistance programs on non-industry lands. This organization was preceded by the American Pulpwood Association, formed in 1934, but the work of this group was initially centered on legislative affairs such as wage and hour provisions and subsequently on development and use of harvesting equipment, safety, and better logging practices.

The work of the Southern Pulpwood Conservation Association stressed demonstrations of good forestry practices including "pilot forests," and technical assistance by "conservation foresters" to individual landowners in such measures as reforestation, and specification of minimum standards for timber harvesting. By 1953, there were some 126 conservation foresters providing such assistance; they represented 17 percent of the foresters employed by southern forest industries at that time.

In 1968, the Southern Pulpwood Conservation Association was merged with the southern office of the American Forest Institute and renamed the Southern Forest Institute. Landowner assistance programs were continued under this new arrangement. More recently this group has become part of the American Forest Council.

Another regional forestry group, the Forest Farmers Association, was formed in 1941 by private forest landowners

to obtain a greater voice for small individual owners in local and national matters affecting their interests. This organization has also been an important force in the conservation of southern forests. Its first actions were directed at securing better markets and prices for timber for its members and at supporting private forest conservation efforts. The Forest Farmers Association has been a particularly effective force in support of (1) greatly expanded research programs of the Forest Service and universities, (2) forestry education and extension, and (3) strengthened action programs for fire control, reforestation, and technical assistance to landowners.

The Forest Farmers Association also cosponsored (with the Southern Pine Association, Southern Hardwood Lumber Manufacturers Association, and American Plywood Association) the southern forest resource analysis project in 1966 that resulted in a report on "The South's Third Forest" (Southern Forest Resource Analysis Committee 1969). This comprehensive study included both an important evaluation of progress and guidelines for future action to further advance the productivity of southern forests. In 1969, a Southern Forest Resource Council was created to work for implementation of recommendations in this report.

A system of tree farms also got its start in the South in 1942, when the American Forest Products Industries Association (now the American Forest Institute) assumed responsibility for this voluntary industry program aimed at encouraging timber production by providing educational information and recognition of good management of private timberlands. As of 1984, there were nearly 30,000 tree farms in the 12 Southern States.

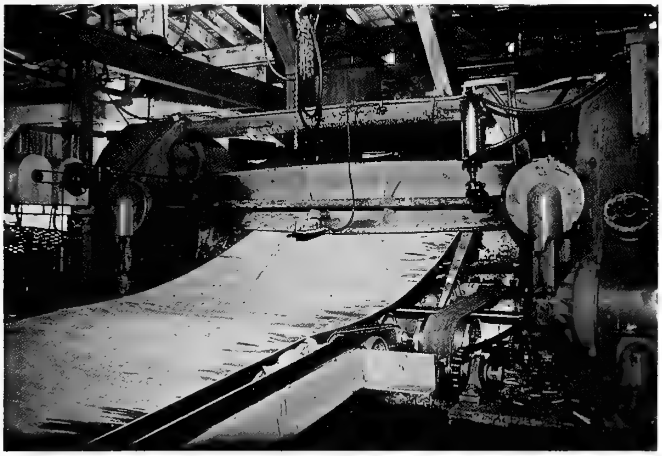
Over the years, a number of State groups starting in the early 1900's have also been organized to advance particular interests. Today the State forestry associations are playing an important role in promoting forest protection and management. The Furniture, Plywood, and Veneer Council (now the Hardwood Research Council) was established in 1953 to promote research and education on the management and utilization of hardwood species. In addition to the Southern Pine Association and Hardwood Lumber Manufacturers Association mentioned earlier, a Southeastern Pine Manufacturers Institute (later merged with the Southeastern Lumber Manufacturers Association) was formed in 1954 to give small lumbermen a greater voice in local and national forestry affairs.

A system of "Tree Farms," a voluntary forest industry program aimed at encouraging timber production by providing educational information and recognition of good management of private timberlands, was started in the South in 1942. As of 1984, there were nearly 30,000 Tree Farms in the 12 Southern States.

Products Overview

During the 1960's, a new southern pine plywood industry also developed in the South through joint efforts of plywood producers and researchers at the Forest Products Laboratory in developing efficient techniques for producing plywood from second-growth southern pines. In 1963, a plant of the Georgia Pacific Company in Fordyce, AR, produced the first rotary-peeled, exterior-glued structural plywood from southern pine.

Over the next two decades, southern pine plywood production climbed steeply (fig. 2.12, app. table 2.28). After 1982, new plants built to produce waferboard and oriented strand board added to the growing softwood structural "panel board" industry. In 1984, production of softwood plywood in the South reached 9.7 billion square feet (3/8-inch basis), or nearly half of total production in the United States. Some of the increase in southern production was at the expense of production of Douglas-fir and other western species that had long dominated softwood plywood markets.



During the 1960's, a new industry was started in the South through joint efforts of plywood producers and researchers at the Forest Products Laboratory. They developed efficient techniques for producing softwood plywood from second-growth southern pine. In 1984, production of softwood plywood in the South was 9.7 billion square feet (3/8-inch basis), nearly half of the total production in the United States.

The lumber industry has also shown a strong upward trend since the 1930's, with production reaching about 13.4 billion board feet in 1984 (app. table 2.3). Softwoods made up about 80 percent of this total and hardwoods, the remainder.

Southern forest industries also have long been a principal source of other forest products such as poles, piling, cooperage, hardwood plywood and veneer, as well as fuelwood for both domestic and industrial uses. Numerous wood-preserving plants have operated in the South for many decades to provide consumers with treated poles, piling, railroad ties, and various construction items.

As described at the beginning of this chapter, the southern pulp and paper industry also has become the source of most turpentine and rosin, displacing both gum and steam-distilled wood. The first plant to produce high-quality rosin and fatty acids from tall oil by skimming off spent cooking liquors in the sulfate process was opened in 1949 by the International Paper Company. Recovery of turpentine from gases generated in the sulfate pulping process began in 1944 and also expanded steadily. By 1984, tall oil represented 76 percent of the total production of rosin, and sulfate turpentine made up 93 percent of the total production of turpentine (figs. 2.1 and 2.2, app. tables 2.1 and 2.2).

Changes in the output of southern forest industries have radically altered the relative importance of different products and corresponding requirements for timber resources. Up to the 1930's, the lumber industry was by far the dominant user of both pines and hardwoods. Though lumber production in the South increased considerably after the low point of the 1930's, by 1954 the rapidly expanding pulp and paper industry was using more wood fiber than sawmills. Pulpwood use also continued to climb rapidly thereafter, to some 3.2 billion cubic feet of roundwood in 1984, or about 42 percent of the total volume of roundwood harvested in the region (fig. 1.3, app. table 1.2).

Sawlogs produced in the South in 1984 comprised some 2.8 billion cubic feet, or 37 percent, of the total roundwood produced; however, a substantial portion of these sawlogs ended up in the pulp and paper industry in the form of chips. By 1984, use of logs for veneer and plywood had climbed to nearly 0.7 billion cubic feet, or 9 percent of the total. Other roundwood industrial products amounted to 0.1 billion cubic feet. Use of fuelwood dropped to low levels in the post-World War II years but by 1984 had risen to over 0.7 billion cubic feet, or nearly 10 percent of the total timber harvest in the South.

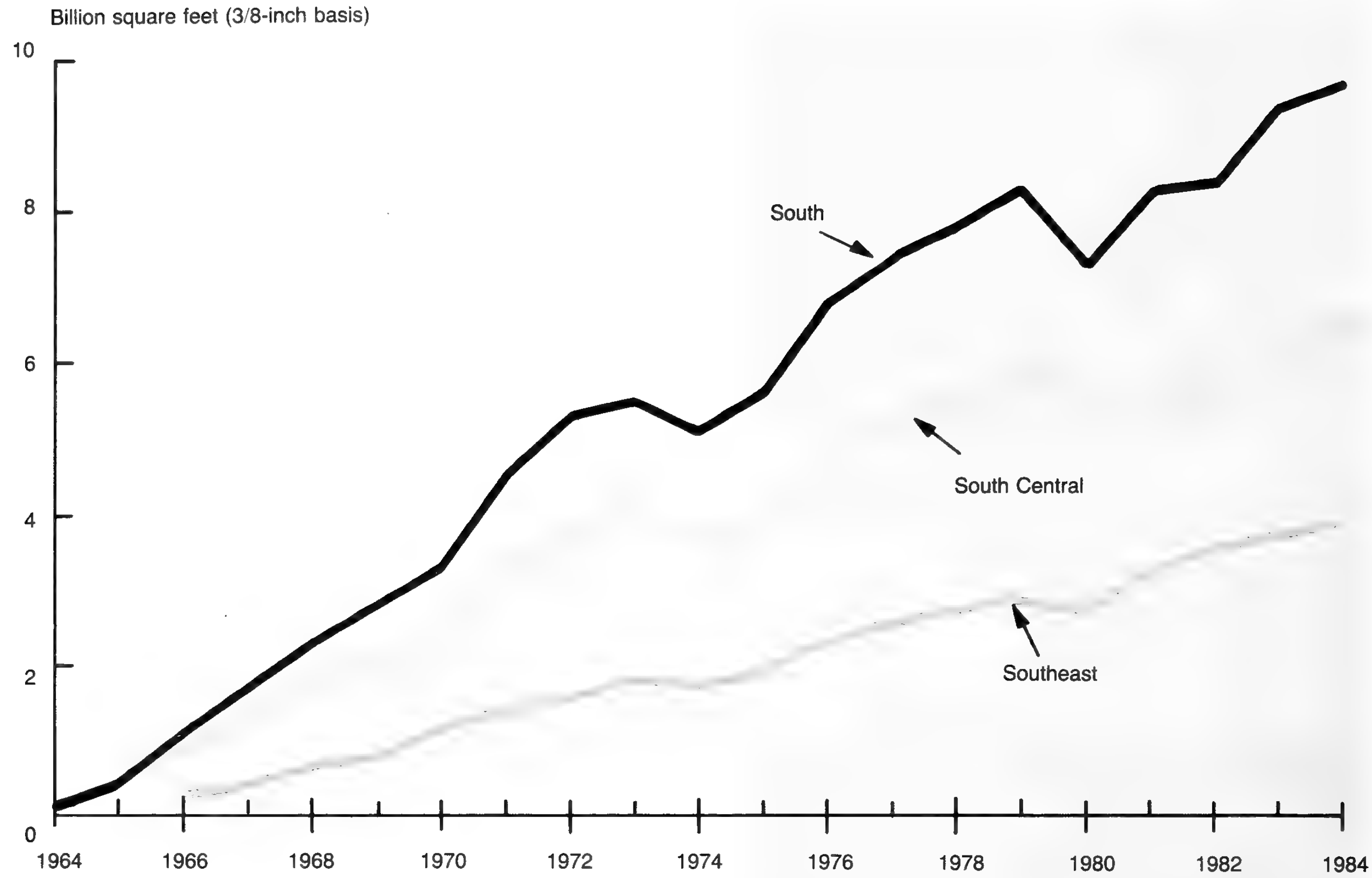


Figure 2.12—Softwood plywood production in the South, by region, 1964–84

Nontimber Uses of Timberlands

In addition to timber, the lands of both the forest industries and other private and public owners of southern timberlands have continued to provide other products and services as well. With intensified management of these lands for timber after World War II and adoption of fencing laws in various Southern States, livestock raising in southern timberlands decreased, particularly the raising of the semiwild razorback hogs that for decades had limited forest regeneration in many areas. Nevertheless, considerable grazing by cattle has continued on many timberlands, and research by the Forest Service and State experiment stations has demonstrated that livestock grazing can often be successfully integrated with timber management.

Hunting has also continued to be an important food-producing and recreational use of southern timberlands. Hunters have opposed certain timber harvesting and management practices. Cutting down hardwoods and replacing them with pine plantations, for example, has often been unacceptable to hunters of deer, squirrel, and turkey. But research and experience have identified ways of integrating timber management with production of wildlife, particularly species such as deer and quail.

Hunting has always been and continues to be an important food-producing and recreational use of southern forests. Although there has been conflict over certain timber harvesting and management practices, research has developed ways of integrating timber management with the production of wildlife. Many industrial owners and other private owners now manage their lands to sustain and enhance wildlife populations.

Many industrial and other timberland owners have leased hunting rights to hunting clubs or others both to capture some income and to reduce the likelihood of arson by disgruntled hunters. Other recreational uses have also become increasingly popular in southern timberlands, particularly on national forests and other public lands. Many of the larger private owners are also providing recreational opportunities to the public, especially to the local people.

From the above discussion, it is apparent that a wide array of forces has affected the timber resource in the South. Changes in stumpage prices have also had impacts, largely because of price influences on management practices.

Stumpage price is the selling price of standing timber. Most of the timber harvested in the South is sold as stumpage by the timberland owners and then logged by the forest industries or independent loggers.

From the 1800's through the 1930's, stumpage prices for pine sawtimber in the South were very low—only a few dollars per thousand board feet (fig. 2.13, app. table 2.29). During most of this period, low prices reflected the plentiful supply of timber in the country. In the 1930's, they also reflected the effects of the Depression, and to a certain extent, declines in timber quality.

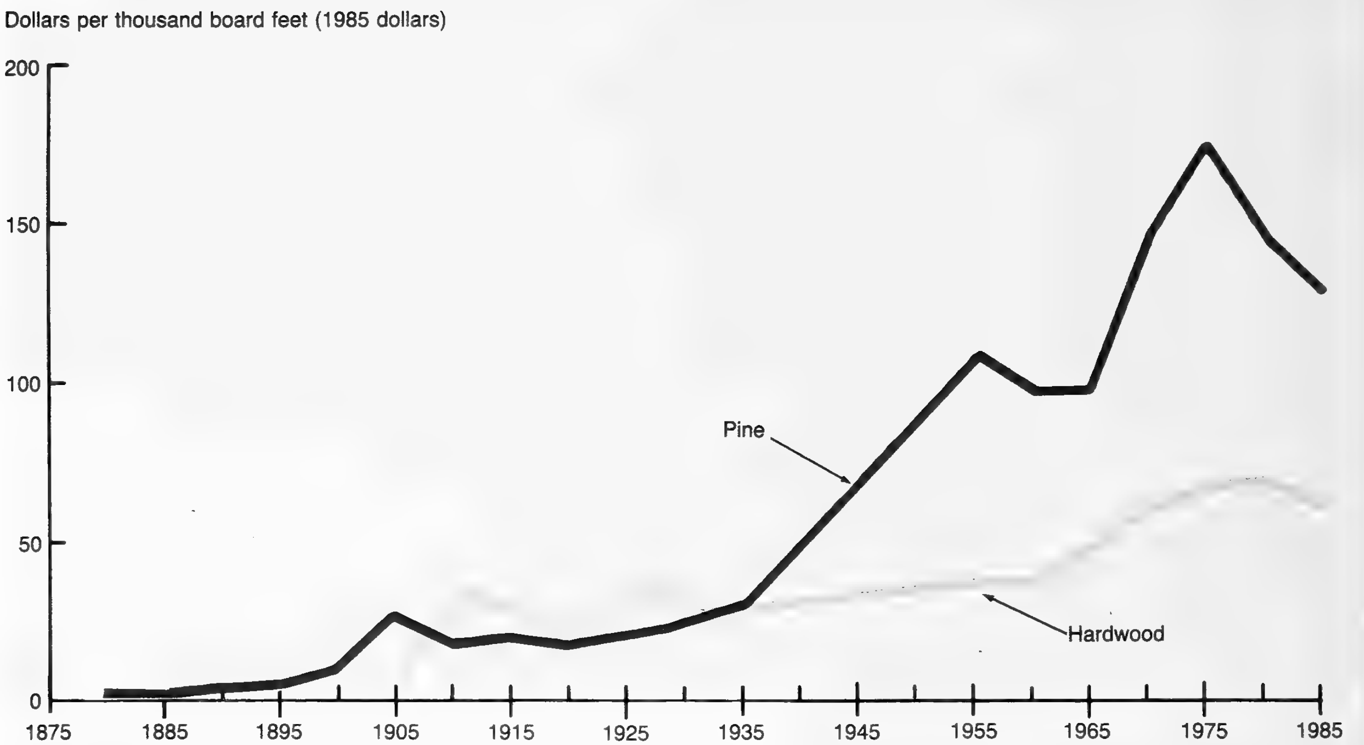


Figure 2.13—Average stumpage prices for sawtimber on privately owned land in the South, 1980–1985. Prices are 5-year moving averages from several price series

From the 1800's through the 1930's, stumpage prices for pine sawtimber in the South were very low—only a few dollars per thousand board feet. During these years, the economic opportunities that would yield competitive rates of return on investments in management practices must have been very limited. By the early 1950's, stumpage prices had reached a level where large opportunities to manage timber did exist, and there are still large opportunities today. Only part of these opportunities are being utilized.

Between 1935 and 1955, average pine sawtimber stumpage prices more than tripled in constant dollars. After a decade or so of relative stability in the late 1950's and early 1960's, average pine sawtimber stumpage prices rose sharply again and peaked in the late 1970's. They fell in the early 1980's because of the economic recession.

The available data on hardwood sawtimber stumpage prices show a gradual rise since the early 1900's, although the level of prices for most hardwood timber has been much below that for softwoods (fig. 2.13, app. table 2.30). However, high-quality hardwood timber—large size, preferred species—has brought very high prices, far above those for pine (app. tables 2.34 and 2.35).

There are substantial geographic differences in both pine and hardwood stumpage prices (app. tables 2.31–2.35, and map accompanying app. table 2.33). In recent years, prices for pine sawtimber have been highest in the Coastal Plain. Prices for mixed hardwood sawtimber have tended to be highest in the Mississippi Delta, central plateau, and Appalachian highlands. Softwood pulpwood prices have been highest in the east gulf coastal plain and more recently the west gulf coastal plain. Hardwood pulpwood prices have also been relatively high in these sections as well as in the Mississippi Delta. In general, these differences reflect the amount of competition for the available timber, although variations in timber characteristics and logging, manufacturing, and transportation costs also contribute.

Pulpwood stumpage prices for pine and hardwoods have remained low in most areas (fig. 2.14, app. tables 2.29–2.30 and 2.36–2.37). The long stable trend in pulpwood stumpage prices reflects a favorable timber supply situation due in part to the woodpulp industry's increasing use of pine chips from sawmills and other primary manufacturing plants and to the use of increasing volumes of hardwood.

Before sawtimber stumpage prices began to rise in the late 1930's, they were so low that economic opportunities—the opportunities that would yield rates of return on investments in timber management practices comparable to those obtained in other kinds of investments—must have been very limited. As prices rose, this situation changed. By the early 1950's, prices had reached a level where large economic opportunities to increase timber supplies did exist. This was quantified by studies prepared in the late 1960's and the late 1970's and also by the analysis of economic opportunities contained in chapter 5 of this study.

As stumpage prices have increased, part of the existing economic opportunities have been utilized. Part of the increases in investments that have been made, especially those since the 1940's, reflect an economic or price response. However, all of the studies have shown that there continue to be large opportunities not being utilized. This is in part a result of the market imperfections in the forestry sector. These imperfections and their implications are described at the end of chapter 5.

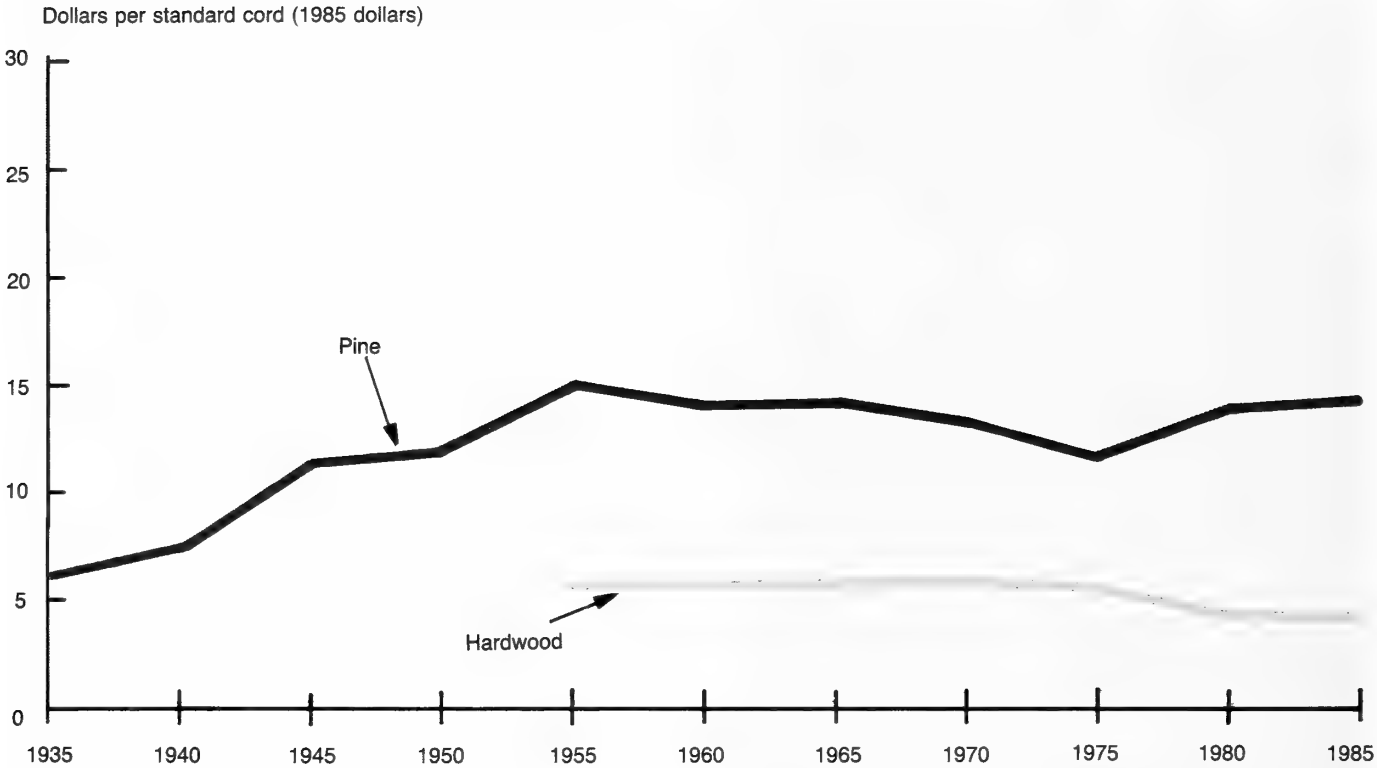


Figure 2.14—Average stumpage prices for pulpwood on privately owned land in the South, 1935–85. Prices are 5-year moving averages from several price series.

Concluding Observations

Society has developed a number of public and private programs to increase the productivity of southern timberlands. These include protection from fire, insects, and disease; technical and financial assistance; research; education; extension; special tax legislation; and public ownership. These programs—Federal, State, and industry—have been based on the assumption that in order to supply potential markets, more timber should be produced than is in prospect, and that more-abundant timber supplies will limit increases in timber prices and benefit society and the economy.

Market forces equilibrate supplies and demands but have not appeared particularly effective in increasing timber supplies, even with the substantial real price increases of recent decades. In the South, the greatest opportunities for increasing timber supplies have been and continue to be on the other private ownerships, and consequently public programs have largely been focused on these holdings.

As a result of public assistance and substantial investments by the forest industries and certain other owners, the South has witnessed great improvements in forest resources and increases in timber supplies. These recent changes in forest resources and the outlook for future years are described in the following chapter.

Literature Cited

Cubbage, Frederick W.; Hodges, Donald G. 1986. Public and private foresters. Journal of Forestry. 84(12): 20–22.

Cubbage, Frederick W.; Skinner, Thomas M.; Risbrudt, Christopher D. 1985. An economic evaluation of the Georgia Rural Forestry Assistance program. Res. Bul. 322. Athens, GA: University of Georgia, College of Agriculture, Agricultural Experiment Stations. 59 p.

Fairchild, F.R., and Associates. 1935. Forest taxation in the United States. Misc. Publ. 218. Washington, DC: U.S. Department of Agriculture. 618 p.

Hough, Franklin B. 1878, 1880, 1882. Report upon forestry. 3 vols. Washington, DC: Government Printing Office. 650, 618, and 318 p., respectively.

Mills, Thomas J.; Cain, Daria. 1979. Financial efficiency of the 1974 Forestry Incentives Program (FIP). Journal of Forestry. 77(10): 661–666.

Risbrudt, Christopher D.; Ellefson, Paul V. 1983. An economic evaluation of the 1979 Forestry Incentives Program. Sta. Bull. 550–1983. St. Paul, MN: University of Minnesota, Agricultural Experiment Station. 55 p.

Royer, Jack P. 1987. Determinants of reforestation behavior among Southern landowners. Forest Science. 33(3): 664–667.

Royer, Jack P.; Kaiser, H. Fred. 1985. Influence of professional foresters on pine regeneration in the South. Southern Journal of Applied Forestry. 9(1): 48–52.

Southern Forest Resource Analysis Committee. 1969. The South's third forest . . . how it can meet future demands. [Place of publication unknown]: Southern Forest Resource Analysis Committee. 111 p.

Chapter 3

Projected Changes in the Timber Resource

One of the primary objectives of this study is to project changes in the South's timber resource. These projections provide a means of identifying future resource problems and for guiding decisions on investments in timber management programs and the construction of processing plants.

Timber Resource Projection Methods

One of the primary objectives of this study is to project prospective changes in the South's timber resource. Projections of changes in timber supplies, removals, growth, and inventories, along with projections of timber demands, provide a means of identifying future or developing timber problems. These projections also guide many decisions on long-range commitments such as investments in plant and facilities, and timber management practices whose effects are realized over an extended period of time. Finally, projections also provide the data base needed for analyzing the economic, social, and environmental implications of a range of policy and program options. The options currently being considered and appropriate to the South are analyzed in the following chapter.

The projections reflect the quantified results of assumptions on the major determinants of changes in the timber resource. There is no intent to predict that these projected trends in the timber resource will actually occur, nor that they should. In fact, it is expected that because of economic, social, and environmental implications associated with these trends, actions will be taken to change them in ways considered more desirable.

The dynamic southern forests present complex problems in preparing resource projections. To deal with this effectively, a large data base and intricate and detailed analytical systems to simulate resource changes have been developed.

Projection Models

Three distinct but closely related analytical systems were utilized. An updated version of the Timber Assessment Market Model (TAMM) was used to simulate roundwood harvest (Adams and Haynes 1980). The Timber Resource Inventory Model (TRIM) was used to simulate changes in timber inventory, growth, and removals (Tedder and others 1987). Changes in timberland area and ownership were simulated with the Southern Area Model (SAM) (Alig 1985).

The Timber Assessment Market Model is a market equilibrium system that projects long-range estimates of price, consumption, and production of timber products and stumpage for various regions in the United States. The system uses variables such as stumpage prices and growing stock inventory to develop roundwood supply equations for softwoods and hardwoods. Timber removals for each ownership group are calculated by equilibrium modeling of timber supply and demand by the Timber Assessment Market Model. The Timber Resource Inventory Model uses timber removal calculations in projecting inventory volumes and growth. This information is fed back to the Timber Assessment Market Model, which then recalculates the equilibrium level of timber removals. This process is repeated iteratively until a tolerable convergence is attained.

The Timber Assessment Market Model was extensively revised for use in this study. Major changes included reestimated equations based on data through 1985 for most relationships, a 15 percent tariff on Canadian exports to the United States, revised capacity series, and a switch from nominal to real Canada/U.S. exchange rates. The demand model was revised for changes in various end-use factors and for changes in panel product classifications into structural and nonstructural groupings. It was calibrated by comparing its projections for 1977–84 with the actual data. In general, the demand projections used in this report start in 1990.

The Timber Resource Inventory Model replaces the Timber Resource Analysis System (TRAS) used in previous Forest Service assessments of this type (Larson and Goforth 1974). The Timber Resource Analysis System is a stand-table projection model in which the timber resource is aggregated by ownership, by softwood and hardwood, and by

2-inch diameter classes. Projections are made by simulating annual changes in timberland and numbers of trees. In contrast, the Timber Resource Inventory Model is an area-based, yield-table system that projects acres by detailed strata for periods consistent with inventory stand-age classes. In this study, 5-year age classes were used. In the Timber Resource Inventory Model, the inventory is represented by an array of acreage cells classified by region, ownership, management type, site productivity class, stocking class, management intensity, and age class (table 3.1). Acreage is shifted among the cells, and volume and growth estimates are derived from acreage movements through assumed yield tables. The Timber Resource Inventory Model easily simulates shifts in management intensity and consequent changes in yields based upon alternative assumptions about the future, a major advantage of the model. The Timber Resource Inventory Model is not, in principle, an even-age model since it can model growth and removal processes across all age classes. However, its treatment of harvest does introduce a bias toward even-aged stands. The Timber Resource Inventory Model currently does not recognize partial harvests; it does recognize thinning. All volume is assumed to be removed at harvest from either the oldest age class or spread across several age classes. Depending on the rate of harvests, this results in all older timber being harvested and, consequently, stand structures with fairly compact age distributions. Harvested acres may enter any acreage cell or leave the timberland base entirely.

Table 3.1—Acreage cell categories used in the Timber Resource Inventory Model (TRIM)

Region	Southeast South Central

Ownership	National forest
	Other public
	Forest industry (including leased lands)
	Other private:
	  Farmer
	  Corporate
	  Other individual

Management type	Pine plantations Natural pine Mixed pine–hardwoods Upland hardwoods Bottomland hardwoods
Site productivity class	High (85 or more cubic ft/acre/yr) Medium (50–84 cubic ft/acre/yr) Low (20–49 cubic ft/acre/yr)
Stocking class	Full (100% or more) Medium (60%–99%) Poor (0–59%)
Management intensity	(Categories vary by owner, site class, and management type. Maximum is 5.)
Age class	0 to 90 in 5-year increments: 18 classes

The Southern Area Model system represents a significant advance for area projections over approaches used in the past. The system uses econometric equations to project area change for each State and ownership. Transition probabilities based on Forest Survey data are used to project area changes for management type on ownerships. Interaction with the Timber Assessment Market Model allows acreage trends to respond to economic changes. The acreage projections are linked with the Timber Resource Inventory Model to establish the acreage within each cell at each projection period.

Equilibrium Conditions

This analysis differs from past assessments of the timber situation in that all projections are made at equilibrium levels. In prior assessments, projections were also presented that had no direct interaction between the base-level projections of timber demands and supplies. Timber demands could rise more rapidly than base-level supplies to create an imbalance or gap. Under equilibrium conditions, prices and production factors are allowed to change until the quantities supplied and demanded are equal.

Equilibrium conditions are achieved by running the three models interactively through an iterative process. Long-term production factors such as management intensity and timberland area are allowed to change in response to projected prices, which in turn are affected by the supply and demand relationships.

Data Base

The data base is critical for determining the starting point for timber resource projections and for developing the relationships and trends that guide the projections. A major part of this study has been to assemble a consistent historical data base for the Southern States spanning the period 1952–85. An exhaustive effort was made to adjust past data to current standards and to extract data for detailed ownership and management categories as far back as possible.

Area estimates were cross-tabulated by ownership and management type for the entire historical period; however, the "other private" category could only be subdivided into "farmer," "corporate," and "other individual" for 1977 and 1985. Softwood and hardwood inventory, growth, re-

movals, and supplies are presented in separate tables for ownership and management type categories.

All historical data were derived from State inventories conducted at various dates from the 1940's to the present as a part of the Forest Survey. Simple interpolation and extrapolation were used to adjust the data to common years, in effect updating or backdating the inventories. Forest Service planting records and long-range ownership trends were used to provide cross tabulations by owner and forest classes for some of the earlier surveys. Estimates for all States for 1985 are strongly influenced by trends in the most recent State surveys in the South, and midcycle or interim surveys where available. The Timber Resource Inventory Model projections began with inventory data from the most recent State survey. The average date of these surveys was about 1980. The first projection period, 1980–85, was used to update and calibrate the Timber Resource Inventory Model input data with the historical data for 1985. Projection results are reported from 1990 to 2030.

State-Level Projections

The Southern Area Model yields State-level area projections because sub-State regions are used as the basic model units. The Timber Assessment Market Model operates regionally (Southeast and South Central) and the Timber Resource Inventory Model, which is capable of operating at the State level, was also run regionally. Thus, the basic projections of timber resource changes were made regionally.

The projections of changes in timber resources in this study are based on a comprehensive data base collected by the USDA Forest Service as a part of a continuing inventory of forest resources—the "Forest Survey."

The State estimates were developed using the State Allocation of Regional Inventory Model (SARI).

This State system maintains consistency with the regional systems by estimating State shares of regional growth, removals, and inventory change due to area change. It uses estimates of regional growth and removals by ownership/management type from the regional model, State acreage projections, and historical State data to make State inventory projections. A State's growth is estimated by (1) its historic growth per acre relative to the other States in the region, (2) its projected acreage of timberland, (3) projected timber inventory, and (4) site quality.

The latest Forest Service survey information in each State is used to estimate growth per acre for each State/owner/management type combination (Abt 1987). Some of the factors affecting State growth (e.g., management intensity and stocking) are accounted for by recognizing differences between owners (forest industry vs. individual) and management types (pine plantation vs. natural pine). Within an owner/management type class, the growth differentials account for differences in site quality, stocking, and species mix. Over the projection period, growth differentials are adjusted to reflect projected differences in inventory per acre and average site quality between States.

Total region removals are allocated to States in a five-step procedure:

(1) Industrial production was shifted between States to maintain historical relative stumpage price differences between States;

(2) Harvest was allocated to States based on ownership mix, changes in inventory, and proportion of regional industrial production;

(3) State harvest was allocated to owners based on changes in inventory by owner and change in State industrial production;

(4) Harvest by ownership within States was adjusted proportionately to be consistent with total regional harvest by ownership and proportion of regional harvest by the State; and

(5) State harvest by ownership was allocated to management types based on inventory and historical removal proportions by management type.

Timber Resource Projection Assumptions

In the future, as in the past, changes in the timber resource will be determined in large measure by growth in population, income, and economic activity; changes in timberland area; and the management intensity and associated yields on those lands available for timber production. It is recognized that future changes in these basic determinants may be much different from those described below. However, these assumptions are consistent with the general societal goals of full employment, continued economic growth, rising income, and improved management of forest resources.

In large part, these assumptions also are based on historical trends and current expectations that are the result of massive social, political, technological, and institutional forces not easily or quickly changed. Thus they should provide a realistic basis for guiding policies and programs in the years immediately ahead.

Population

Trends in total population and changes in its components have important effects on activity in the major timber products markets and are one of the principal sources of pressures on forest lands for conversion to alternate uses, such as food and fiber production, recreation, and urban development. Over the last 55 years, the number of people in the United States has about doubled, to a current level of nearly 242 million (table 3.2, fig. 3.1).

Population greatly affects demand for timber and the conversion of timberland to other uses such as cropland and pasture, recreation, and urban development. By 2030, the U.S. population is expected to be 319 million, with per capita incomes more than twice those of today.

Table 3.2—Population, gross national product, and disposable personal income in the United States, specified years, 1929–85, with projections to 2030

Year	Population[1]		Gross national product		Disposable personal income		Per capita disposable personal income	
	Millions	*Annual rate of change*	*Billion 1982 dollars*	*Annual rate of change*	*Billion 1982 dollars*	*Annual rate of change*	*1982 dollars*	*Annual rate of change*
1929	121.8	—	709.6	—	498.6	—	4,091	—
1933	125.7	0.8	498.5	−8.4	370.8	−7.1	2,950	−7.8
1940	132.6	.8	772.9	6.5	530.7	5.3	4,010	4.5
1945	140.5	1.2	1,354.8	11.9	739.5	6.9	5,263	5.6
1950	152.3	1.6	1,203.7	−2.3	791.8	1.4	5,220	−0.2
1955	165.9	1.7	1,494.9	4.4	944.5	3.6	5,714	1.8
1960	180.7	1.7	1,665.3	2.2	1,091.1	2.9	6,063	1.2
1965	194.3	1.5	2,087.6	4.6	1,365.7	4.6	7,027	3.0
1970	205.1	1.1	2,416.2	3.0	1,668.1	4.1	8,134	3.0
1975	216.0	1.0	2,695.0	2.2	1,931.7	3.0	8,944	1.9
1976	218.0	.9	2,826.7	4.9	2,001.0	3.6	9,175	2.6
1977	220.2	1.0	2,958.6	4.7	2,066.6	3.3	9,381	2.2
1978	222.6	1.1	3,115.2	5.3	2,167.4	4.9	9,735	3.8
1979	225.1	1.1	3,192.4	2.5	2,212.6	2.1	9,829	1.0
1980	227.8	1.2	3,187.1	−0.2	2,214.3	0.1	9,722	−1.1
1981	230.1	1.0	3,248.8	1.9	2,248.6	1.5	9,769	.5
1982	232.5	1.0	3,166.0	−2.5	2,261.5	.6	9,725	−.5
1983	234.8	1.0	3,279.1	3.6	2,331.9	3.1	9,930	2.1
1984	237.0	.9	3,501.4	6.8	2,469.8	5.9	10,419	4.9
1985	239.3	1.0	3,607.5	3.0	2,542.2	2.9	10,622	1.9
1986	241.6	1.0	3,713.3	2.9	2,645.1	4.0	10,947	3.1
				Projections				
1990	252.5	1.1	4,100	2.5	2,890	2.2	11,450	1.1
2000	275.1	0.9	5,390	2.8	3,760	2.7	13,670	1.8
2010	294.2	.7	6,980	2.6	4,810	2.5	16,340	1.8
2020	309.5	.5	8,590	2.1	5,910	2.1	19,110	1.6
2030	319.3	.3	10,570	2.1	7,280	2.1	22,800	1.8

[1] Data for 1929, 1933, and 1940 exclude Alaska and Hawaii.

Note: Annual rates of change calculated for various periods as indicated.

Sources: **Population:** U.S. Department of Commerce, Bureau of the Census. Population estimates and projections. Curr. Pop. Reps. Ser. P-25. *1929–49*—"Estimates of the population of the United States and components of change: 1940 to 1978." No. 802, 1979. *1950–79*—"Estimates of the population of the United States and components of change: 1970-84." No. 971, 1985. *1980–86*—"Estimates of the population of the United States to March 1, 1987." No. 1004, May 1987. **Gross national product, disposable personal income, and per capita disposable personal income:** Council of Economic Advisors. *1929–78*—Economic report of the President. February 1987. *1979–86*—Economic Indicators. July 1987.

Projections—U.S. Department of Agriculture, Forest Service, based on data in Wharton Econometric Forecasting Associates. "Long-term Alternative Scenarios and 25 Year Extension." Vol. 5, No. 1, February 1987.

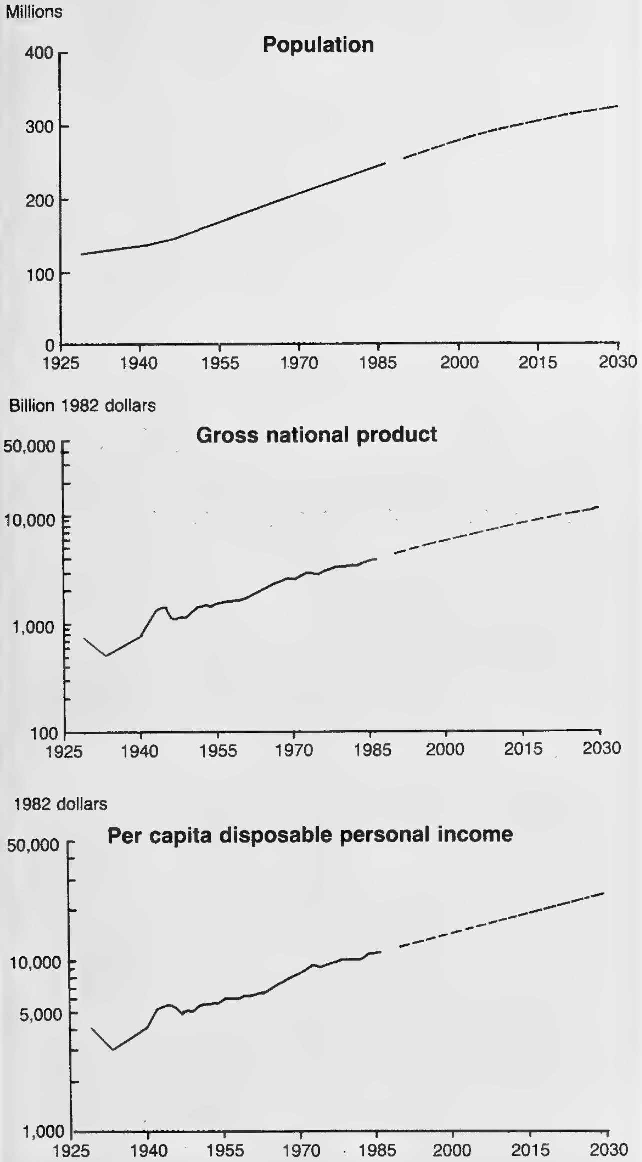


Figure 3.1—Population, economic activity, and income in the United States, 1929–86, with projections to 2030

The most recent projections by the Department of Commerce, Bureau of the Census and Wharton Econometric Forecasting Associates indicate that this upward trend likely will be sustained in the decades ahead. The Wharton projection series used in this analysis shows the Nation's total population reaching 275 million in 2000 and continuing up to almost 320 million in 2030. In line with trends over the past 20 years, however, the average annual rate of growth declines from about 1 percent in the 1980's to 0.3 percent in the last decade of the projection period. Such declines in the rate of growth—primarily a reflection of Bureau of the Census assumptions about future birth rates—mean that the average age of the population will gradually rise over the next 45 years. They also mean a substantial increase during most of the projection period in the number and proportion of people in the middle age classes—those who have the highest incomes and generate the largest demands for goods and services.

Economic Activity and Income

The levels of activity and longrun growth of the important timber products markets are dependent to a large degree on the overall strength of the U.S. economy and the associated income generated for the Nation's population to spend. Despite a major depression and several recessions, U.S. output has shown substantial growth over the past half-century. Between 1929 and 1986, the gross national product, a measure of the market value of all the goods and services produced in the economy, increased more than five times, rising to $3,713 billion, measured in constant 1982 dollars (table 3.2, fig. 3.1). Forest Service projections based on analyses by the U.S. Department of Commerce, Bureau of Economic Analysis and Wharton Econometric Forecasting Associates show a gross national product of $5,390 billion (1982 dollars) in 2000 and a further increase to $10,570 billion in 2030—nearly triple the current level. The associated projection of per capita gross national product rises to $19,590 in 2000 and in 2030 to $33,100, about 2.2 times the 1986 average.

Total disposable personal income—the income available for spending by the Nation's population—is expected to grow from about $2,645 billion in 1986 to $7,280 billion in 2030 (1982 dollars). Per capita disposable personal income rises to $22,800 in 2030, some 2.1 times the average in 1986.

There are major implications associated with these population and income assumptions. Such growth means that the Nation is faced not only with the task of meeting the resource demands of an additional 78 million people, but the

demands of 320 million people with much greater purchasing power than they have today. Although demand for services is expected to account for a large part of the additional demands generated by more people with larger incomes, substantial growth in the demands for furniture, newspapers, magazines, and other goods made in whole or in part from timber products is likely.

Institutional, Technological, and Other Changes

In the past, institutional and technological changes have materially influenced the use and availability of timber and other renewable resources. For example, increasing urbanization and attendant land constraints have contributed to a larger proportional demand for attached single-family houses and apartments—units that are generally smaller and use less wood products per unit of floor area than detached houses. Similar institutional changes have influenced the design and construction of large urban buildings in which wood products use is limited by building codes or other restrictions.

Technological change also has affected the demand for timber. The development of economical water-resistant adhesives led to large increases in plywood consumption in the 1950's and 1960's. In turn, rising plywood use was a major factor in holding down lumber consumption during this period. More recently, development of other panel products, such as structural waferboard and oriented strand board, has resulted in the displacement of plywood for many of the same uses in which it earlier replaced lumber. New technology also has engendered large increases in hardwood use in pallets and other panel products such as hardboard and particleboard and in paper and board products.

At any time, potential institutional and technological changes on the horizon could affect the demand for timber products. But the nature and effect of many of these potential changes are similar to those that have taken place in the past and are accounted for in the historical data used in preparing the projections.

Changes in energy costs have substantial effects on the demand for timber products, both through their impact on the level of economic activity and through their direct impact on the use of the various products, especially fuelwood.

Moreover, the current long-term outlook for energy costs is clouded by the drop in fossil fuel prices in the 1980's, after extremely rapid growth in the preceding period. However, most recent analyses, including one by Wharton Econometric Forecasting Services (1986), indicate that

Energy costs have substantial impacts on the demands for timber products, particularly fuelwood. Most energy analysts expect upward pressure on oil prices in the 1990's and beyond. This trend will surely lead to increased demands on domestic timber resources for fuelwood.

worldwide demand for crude oil is likely to approach capacity levels around the turn of the century, even without restraints by the Persian Gulf countries. This is expected to again create significant upward pressure on real oil prices in the 1990's and beyond to the extent that Wharton projects that the production of synthetic fuels will become economically viable.

Substantial amounts of capital will be required to make the necessary investments in management, physical facilities, and processing plants to accommodate increased demands for timber products. But with the expected growth in gross national product discussed earlier, it does not appear that capital availability will significantly constrain long-term economic growth in general or intensified use of timber resources.

Trends in Timber Use and Projected Demands

The volume of roundwood removed from the inventory of timber in the Nation's forests is largely determined by the harvests of timber for the production of lumber, paper and board, panel products, and for fuelwood. These timber removals and net annual growth are the major determinants of change in timber resources.

Timber has been harvested since settlement began. Starting then, and for a long time after, timber was the Nation's most important raw material. It had wide use in all types

of construction and manufacturing, ranging from houses, bridges, and even road surfaces to the wagons and ships that provided the chief means of transportation. It was also the main source of fuel for domestic and industrial uses.

Although over the years industrial and household users turned more and more to products made of iron, steel, plastics, and other raw materials and to fuel oil, gas, and other nonwood materials for power and heating, the demand for timber products continues. And in total, in recent decades it has been rising.

Between 1950 and 1984, U.S. consumption of all timber products (including round fuelwood from nongrowing stock sources) increased by more than 50 percent, rising from about 12 billion to nearly 19 billion cubic feet. Although consumption of round fuelwood increased rapidly in the late 1970's and early 1980's, this came after declines throughout the 1950's and 1960's. In contrast, consumption of industrial timber products increased fairly steadily over the 35-year span. During this period there was growth in consumption for nearly all industrial timber products; however, most of the increase was in pulp products and in plywood, veneer, and other panel products.

Trends in the Major Timber Products Markets—Demands for solid wood products such as lumber and the various timber-based structural and nonstructural panel products[1] are determined largely by trends in the major timber products markets—housing, nonresidential construction, manufacturing, and shipping.

Housing—In terms of volumes consumed, residential construction long has been the most important market for most

[1] Structural panel products include softwood plywood, oriented strand board, waferboard, and composite board—a waferboard or particleboard and veneer combination panel. Nonstructural panel products include hardwood plywood, particleboard, insulating board, and hardboard.

Housing is the largest market for most timber products. Roughly half of the lumber, two-thirds of the structural panel products, and substantial volumes of nonstructural panels are used in the construction, upkeep, and improvement of housing.

timber products. Over the past decade, roughly half of the lumber and two-thirds of the structural panel products, plus substantial volumes of nonstructural panel products, have been used in the production, upkeep, and improvement of housing. About 75 percent of the total timber products used in housing over this period went into the construction of new housing units. The remaining 25 percent was used for upkeep and improvement of existing units.

Production of new housing in the United States—conventional units and mobile homes—averaged 1.6 million units a year during the 1950's and 1960's, moved up to over 2.3 million units in the early 1970's, but subsequently dropped sharply in the late 1970's and early 1980's (table 3.3, fig. 3.2). In 1983 and 1984, total output again rose above 2 million units.

Table 3.3—Average annual production of new housing units in the United States, by type of unit, specified periods, 1950–84, with projections to 2030

Thousand units

		Conventional units			
Period	Total demand	Total	Single-family	Multi-family	Mobile homes
1950–54	1,692	1,619	1,434	185	73
1955–59	1,569	1,455	1,260	194	115
1960–64	1,601	1,470	996	474	131
1965–69	1,695	1,415	860	554	281
1970–74	2,342	1,868	1,059	810	474
1975–79	1,961	1,703	1,227	477	258
1980–84	1,649	1,391	874	516	259
			Projections		
1985–89	1,997	1,723	1,167	556	247
1990–94	1,954	1,656	1,156	501	298
1995–99	2,005	1,688	1,123	565	317
2000–04	2,176	1,840	1,196	645	336
2005–09	2,012	1,713	1,118	595	300
2010–14	2,042	1,733	1,144	589	309
2015–19	2,062	1,749	1,153	596	313
2020–24	1,973	1,664	1,094	570	309
2025–29	1,834	1,529	1,002	527	305

Note: Data may not add to totals because of rounding.

Sources: **Housing starts:** *1950–58*—Forest Service estimates based on data published in U.S. Department of Commerce, Bureau of the Census. Housing construction statistics 1989 to 1964. 1966. *1959–84*—U.S. Department of Commerce, Bureau of the Census. Housing starts. Cons. Reps. Ser. C20. Annual.

Projections: U.S. Department of Agriculture, Forest Service, based on data in Wharton Econometric Forecasting Associates. "Long-term Alternative Scenarios and 25 Year Extension." Vol. 5, No. 1. February 1987.

Analyses based on projections of the factors that determine longrun demands for new housing units—household formations, replacement of units lost from the housing stock, and maintenance of an inventory of vacant units—indicate continued high levels of demand in the late 1980's, resulting in an average of nearly 2.0 million units for the last half of the decade. Housing demand remains at about 2.0 million units in the 1990's, peaks at near 2.2 million early in the next century, and subsequently drops to between 2.0 and 2.1 million through 2020. Over the last 10 years of the projection period, total demand gradually declines to about 1.8 million units.

The type of housing units demanded—single-family, multifamily, mobile home—is of major importance in projecting demands for timber products because of the large differences in the average amounts of timber products used in each type.

Single-family houses are typically occupied by households whose heads are in the middle age classes, while occupancy of units in multifamily buildings and mobile homes is highest among households headed by younger and older persons. As a result of prospective shifts in the age distribution of the population, and the associated changes in household types and income, the numbers of conventional single-family units demanded are projected to fluctuate but generally remain near 1.1 to 1.2 million through most of the projection period. The numbers of multifamily units demanded show the same trend. Demand for mobile homes—most of which will be produced for primary residential use and are expected to become larger and more houselike—remains relatively constant at 300,000 to 340,000 units a year through the projection period. This is just slightly larger than the number of units discarded each year.

In addition to the numbers of new units demanded, their size is also an important determinant of the amount of timber products used in housing. The average size of single-family housing units, though showing some fluctuation, has grown fairly steadily over the past 35 years, rising from near 1,150 square feet in the early 1950's to about 1,825 square feet in 1986. This increase in floor area has resulted in little loss in average lumber use per single-family unit, despite a declining trend in use per square foot of floor area. The size of units in multifamily structures also increased; however, the rise has been somewhat smaller and

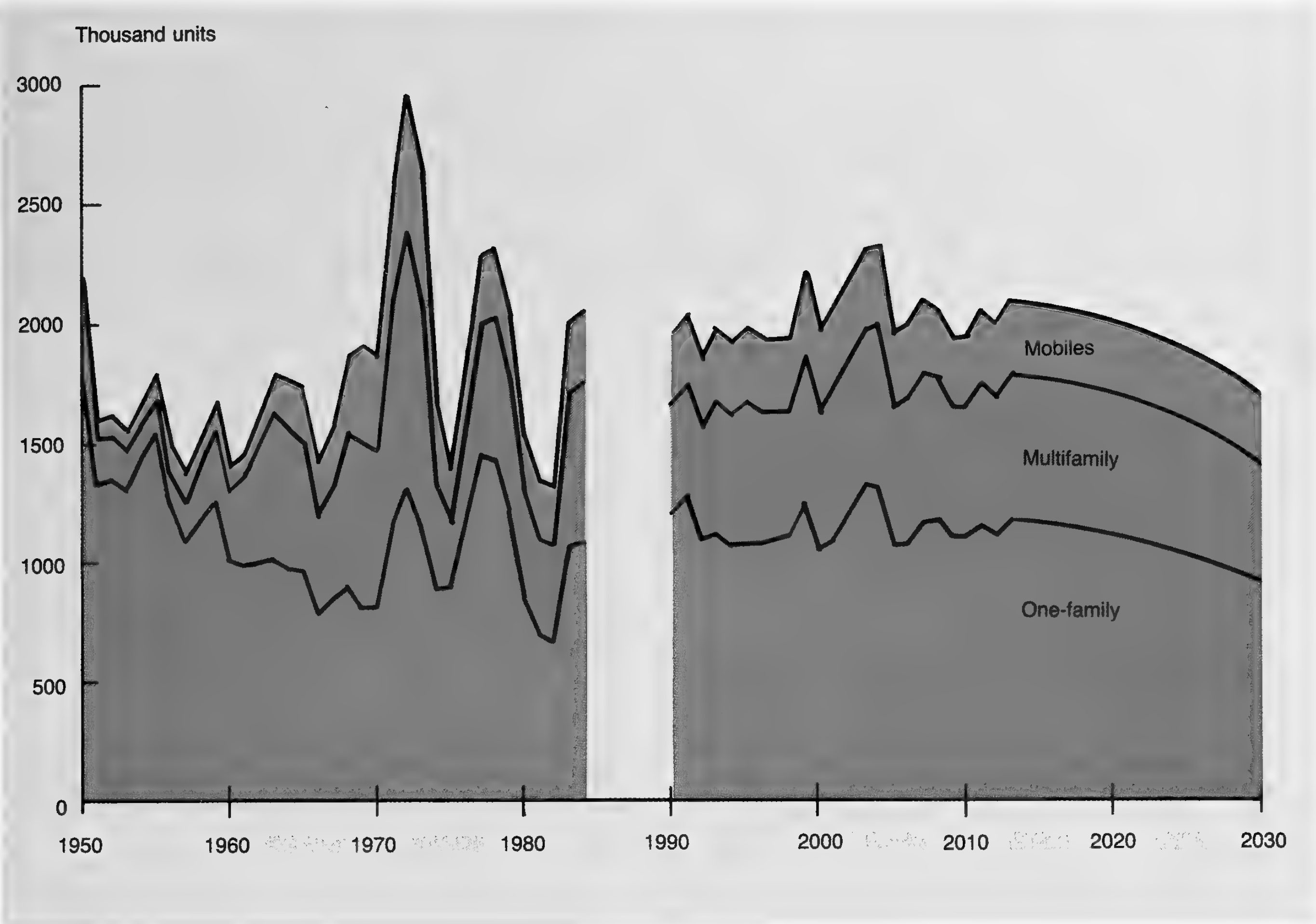


Figure 3.2—New housing unit production in the United States, by type of unit, 1950–84, with projections to 2030

more erratic. For example, the size of average new multifamily units in 1986 was about 911 square feet, 15 percent above the average in the early 1950's, but down 10 percent from the mid-1970's. Average floor area in new mobile homes, which more than doubled between 1950 and the mid-1970's, has continued to rise because of the introduction of double-wide and expandable units.

It has been assumed that rising incomes and consumer preference for more space will lead to continued future growth in average size of all types of units. However, because of such factors as land costs and declines in household size mandated by changing demographics, such increases are expected to be much slower than in the past. For example, the average floor area of single-family houses is projected to reach 2,000 square feet by 2030, an increase of less than 0.25 percent per year. Growth between 1950 and 1986 averaged about 1.4 percent a year. The size of units in multifamily structures is expected to rise to 1,100 square feet, about 75 square feet above the average in the mid-1970's.

In addition to the timber products consumed in the production of new housing units, substantial and growing volumes—about 20 percent of the lumber and structural panel products and 15 percent nonstructural panel products—are used each year for the upkeep and improvement of existing units. Such growth is expected to continue in the future as the Nation's inventory and average age of housing units increase.

New Nonresidential Construction—In recent years about 10 percent of the lumber, plywood, and other structural and nonstructural panel products has been used in the construc-

tion of offices, stores, churches, and a wide variety of other nonresidential buildings, and in other types of construction such as roads, dams, and water and sewer systems. Although expenditures for the various classes of construction have fluctuated widely in response to changing economic conditions, the longrun trend for all types combined has been strongly upward.

Projections based on the close historical relationship between changes in the Nation's overall economic growth (gross national product) and changes in expenditures for nonresidential building and nonbuilding construction indicate substantial additional expenditures over the next 45 years. However, the rates of growth underlying these projections drop throughout the projection period. There is also a decline in new nonresidential construction expenditures as a percentage of gross national product. This is consistent with trends since the late 1960's, and with estimates that the service industries will account for a growing share of the Nation's gross national product in the years ahead.

Manufacturing—Since the mid-1970's about 10 percent of the lumber, 5 percent of the structural panel products, and nearly 25 percent of the nonstructural panel products have been used for the manufacture of a wide range of products such as household furniture—the largest manufacturing use of timber products—sports equipment, games and toys, and commercial and industrial equipment.

Since World War II, as the Nation's population, income, and gross national product have grown, demands for manufactured products have increased markedly. Estimates, based on the close correlations between the values of shipments of certain groups of manufactured products and projected changes in the economic and demographic variables discussed earlier, indicate continued growth in the years ahead. However, as in the case of nonresidential construction, the rates of increase in the value of shipments for all groups of products, including household furniture, drop significantly over the projection period.

Shipping—In recent years, nearly 18 percent of the lumber and about 3 percent of the structural and nonstructural panel products consumed have been used in the production of wooden pallets, container manufacture, and for dunnage, blocking, and bracing of goods for shipping. About three-fourths of the lumber and nearly two-thirds of the panel products consumed in shipping were used for pallets.

Over the past three decades, pallet production has risen rapidly as new methods of materials handling were introduced, facilities geared to the use of pallets were constructed, and the volumes of manufactured and agricultural goods shipped have increased. Projections of pallet output, based on its historically close relationship with the value of manufacturing shipments and the assumed growth in shipments as the gross national product rises, indicate continued growth in demands for pallets.

Although increased demand for pallets is expected over the entire projection period, the rates of growth drop rapidly. In addition to increasing competition from alternate systems and materials, such a falloff means that growth in pallet demand for use in new materials-handling systems gradually ends, and that expansion thereafter depends to a large degree on growth in industrial and agricultural production.

The other timber-products shipping markets—wood containers, and dunnage, blocking, and bracing—are likely to decline slowly over the projection period, in response to continued displacement by metal and fiber barrels and pails, and other fiber and plastic containers, and due to the rising use of palletized, containerized, and other bulk shipment systems.

Trends in Unit Use—The projected levels of activity in the major markets discussed above are only one of the determinants of future demands for lumber and panel products. Also important are changes in product unit-use factors, that is, the volume of timber products used per square foot of housing unit floor area, per dollar of construction expenditure, per pallet, or other measure of market change.

In recent decades, pallet production has increased rapidly and created a new and large market for lumber, chiefly hardwood lumber.

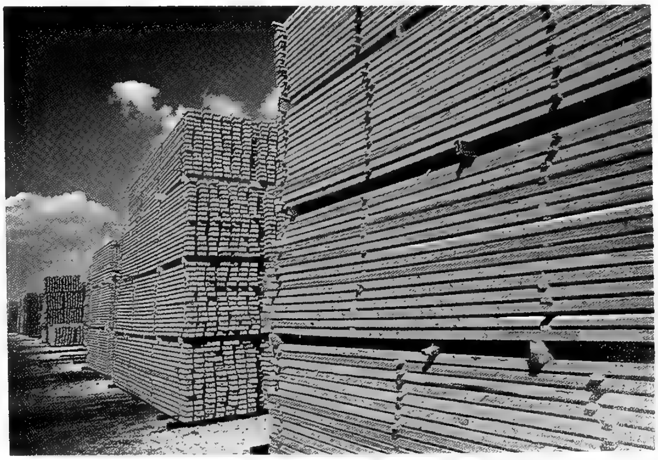
In response to changes in the price of timber products, both actual and relative to prices of competing wood and non-wood products; improving construction and manufacturing technology, building codes, and other institutional factors; and changes in consumer preferences and tastes, there have been widely divergent trends in the unit-use of the major timber products over the past 35 years. For example, in housing and other types of light building construction, there was extensive displacement of lumber subflooring and sheathing by softwood plywood in the 1960's and early 1970's. Lumber use per square foot of floor area in housing also was adversely affected by the substitution of carpeting for hardwood flooring, and by the increasing use of roof trusses and other prefabricated components. Growth in the use of softwood plywood, metal, and paperboard concrete-forming materials in large buildings and other structures, and the substitution of particleboard for lumber corestock and plastics for other wood parts in furniture manufacture also caused declines in the unit-use of lumber in the nonresidential and manufacturing markets. In shipping, lumber use per pallet also fell, in part because of the substitution of other timber products such as plywood, hardboard, and particleboard.

In contrast to the downward trends in the unit-use of lumber, use of the other major timber products rose in most of the key markets, although, as discussed above, this growth often resulted from their substitution for lumber or other timber products. The increases in plywood use per square foot of floor area in housing and per dollar of expenditures in other types of construction, and the rise in particleboard, medium-density fiberboard, and hardboard per dollar of manufacturing shipments were particularly large in the 1960's and 1970's. More recently, however, softwood plywood subflooring and roof and wall sheathing have begun to be displaced by the relatively newer waferboard and oriented strand board products.

In the future, relative prices and the nonprice factors cited above will continue to be the primary determinants of change in the unit-use of timber products. Accordingly, projections of product-use factors for the major markets have been based on current trends, judgmentally modified to be consistent with the most likely future movements of relative prices and associated changes in the various nonprice factors. In general, this procedure has resulted in a continuation of recent trends in the various unit-use factors over the next few years. For example, additional increases in the factor for oriented strand board/waferboard products in housing and other light building construction are projected due to their likely continued penetration of traditional softwood plywood uses because of price advantages. And, in recognition of this, the use factor for softwood plywood in these markets has been projected to decline.

For the longer run, the projected rates of increase or decrease for the various product unit-use factors have been reduced in recognition of the fact that continued change becomes more difficult as markets are saturated or as market share approaches zero. This phenomenon, which can be due to localized price or to institutional and other nonprice factors, has apparently already taken place in the case of lumber used for residential sheathing and subflooring, where there has been nearly a total displacement by structural panel products. Since this substitution was one of the major reasons for the rapid drop in the lumber use-factor for housing during the 1960's and early 1970's, only a gradual decline due to other causes is likely during the projection period. As markets for a particular product become saturated, any future rises in its total use will depend on the development of new markets or increased activity in those already established.

Consumption and Projected Demands for Lumber and Panel Products—Based on the projections and assumptions about the major markets discussed earlier in this section, demands for lumber and the various structural and nonstructural panel products are projected to follow somewhat diverse trends over the next 45 years. In terms of volume, the largest increases for lumber are expected to be in shipping; for oriented strand board/waferboard, in residential construction; and for hardboard and particleboard, in



In recent years, lumber consumption has been nearly a third above the levels of the 1950's and 1960's. Demand for both softwood and hardwood lumber is expected to rise slowly over most of the projection period.

manufacturing. For insulating board and softwood plywood, the declines in residential construction are particularly important in keeping consumption relatively flat through the projection period.

In addition to the major markets discussed above, additional volumes of timber products are used for a number of other purposes for which there are no historical data on consumption. Among these are upkeep and improvement of nonresidential structures, roof supports and other construction in mines, over-the-counter sales for home woodwork projects, and made-on-the-job products such as advertising and display structures.

Because of the lack of a statistical base for projecting these markets, it was assumed that use for these purposes would rise in line with projected demands in the other markets, except housing. New housing was excluded because its demand is so strongly influenced by population demographics.

Lumber—Lumber consumption in all uses in 1984 was 50.8 billion board feet (table 3.4, fig. 3.3). This was almost 30 percent above average consumption in the 1950's and 1960's, and only slightly below the all-time high, 52.9 billion, reached in 1978. Estimated total demands for lumber rise throughout the projection period, reaching 62.4 billion board feet in 2030. The most rapid increases occur by early in the next century, as the use of softwoods in construction and hardwoods in manufacturing and shipping continue at relatively high levels. After 2010, declining housing starts and the somewhat slower rates of increase in economic growth and income affect both hardwood and soft-

Table 3.4—Lumber consumption, exports, imports, and production in the United States, specified years, 1952–84, with projections to 2030

Year	Consumption				Exports			Imports			Production		
	Total	Per capita	Softwoods	Hardwoods	Total	Softwoods[1]	Hardwoods	Total	Softwoods[1]	Hardwoods	Total	Softwoods	Hardwoods
	Billion board feet	*Board feet*	*Billion board feet*										
1952	39.4	250	31.9	7.5	0.7	0.6	0.2	2.5	2.3	0.2	37.7	30.2	7.4
1962	37.9	203	30.8	7.1	.8	.6	.1	4.9	4.6	.3	33.8	26.8	7.0
1970	39.6	193	32.2	7.5	1.2	1.1	.1	6.1	5.8	.3	34.8	27.5	7.2
1976	44.9	206	36.9	8.0	1.8	1.6	.2	8.2	8.0	.3	38.5	30.6	8.0
1984	50.8	214	42.9	7.9	2.2	1.6	.5	13.6	13.3	.3	39.3	31.2	8.1
	Projections												
Year	Total demand				Exports			Imports			Demand on U.S. mills		
1990	55.6	220	47.2	8.4	2.5	2.0	0.5	16.4	16.0	0.4	41.7	33.2	8.5
2000	56.9	207	48.0	8.9	2.8	2.2	.6	15.9	15.4	.5	43.8	34.8	9.0
2010	59.9	204	50.3	9.6	2.8	2.2	.6	15.6	15.0	.6	47.1	37.5	9.6
2020	62.2	201	52.0	10.2	3.0	2.3	.7	13.4	12.7	.7	51.8	41.6	10.2
2030	62.4	195	51.8	10.6	3.0	2.3	.7	12.5	11.8	.7	52.9	42.3	10.6

[1] Includes small volumes of mixed species (not classified as softwoods or hardwoods).

Note: Data may not add to totals because of rounding.

Sources: **Production**—*Softwoods:* 1952–76—U.S. Department of Commerce, Bureau of the Census. Lumber production and mill stocks. Curr. Ind. Reps. Ser. MA-24T. Annual. 1984—Western Wood Products Association. **Production**—*Hardwoods:* U.S. Department of Agriculture, Forest Service estimates based on data developed by C.S. Binkley and P.A. Cardellichio, School of Forestry and Environmental Studies, Yale University, New Haven, CT. **Imports and Exports:** U.S. Department of Commerce, Bureau of the Census. *Imports*—U.S. imports for consumption and general imports: TSUSA commodity by country of origin. FT 246. Annual. *Exports*—U.S. exports/schedule E, commodity by country. FT 410. Monthly.

Projections: U.S. Department of Agriculture, Forest Service.

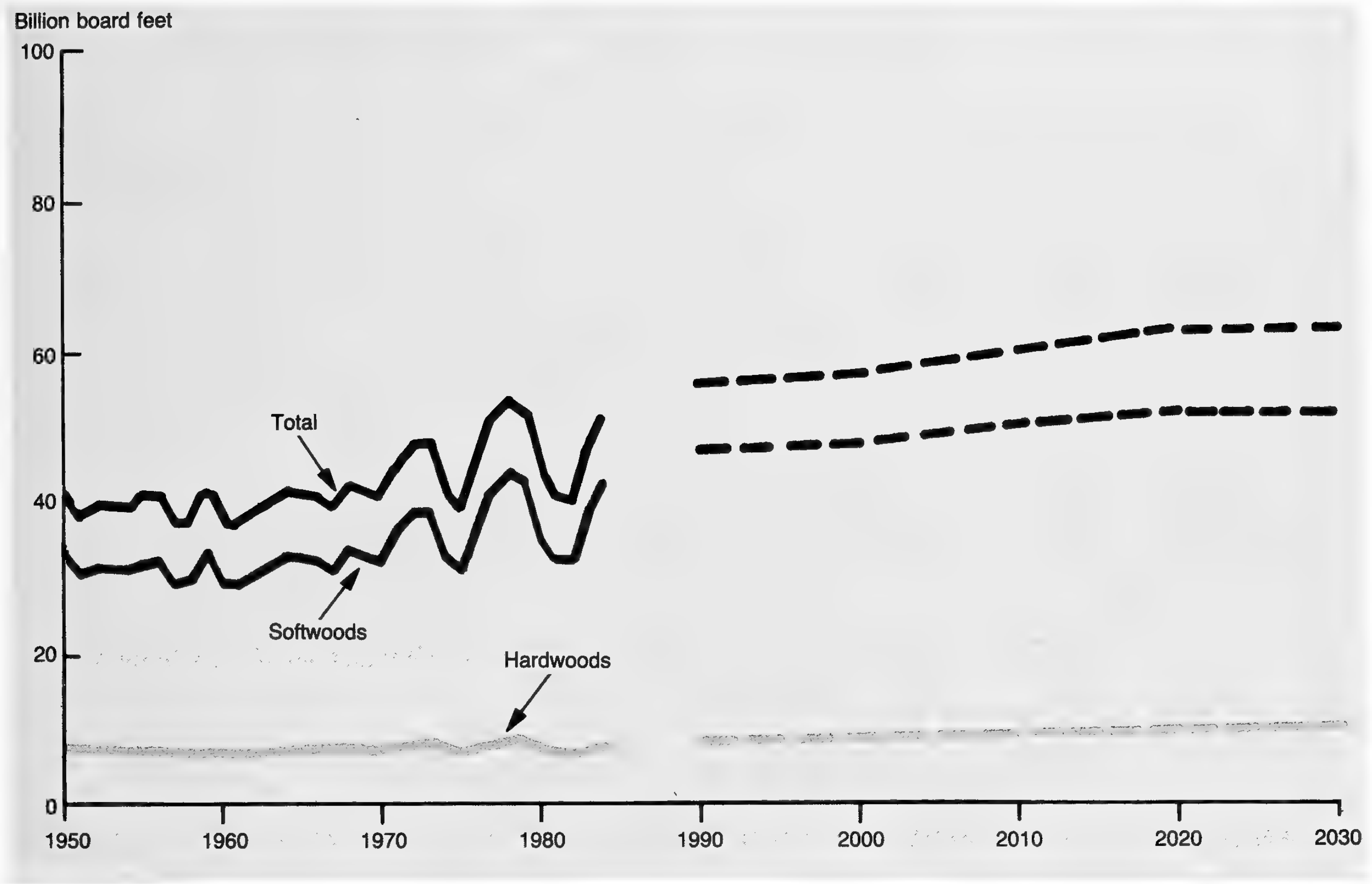


Figure 3.3—Lumber consumption in the United States, 1950–84, with projections to 2030

wood use, and total consumption in the last decade of the projection period rises only 0.2 billion board feet.

In 1984 softwood species composed nearly 84.5 percent of the lumber consumed. However, over the projection period, a slow increase in the proportion of hardwoods is expected because of growth in uses such as shipping (pallets) and manufacturing (furniture), where hardwoods are relatively more important, coupled with declines late in the period in some of the major softwood markets, particularly residential construction.

Structural Panel Products—Structural panels (softwood plywood and oriented strand board/waferboard) consumption reached 22.4 billion square feet (3/8-inch basis) in 1984—60 percent above the volume consumed in 1970 and seven times total use in the early 1950's (table 3.5, fig. 3.4). Until the 1970's, softwood plywood was the only one of the products in wide use; and primarily because of its substitution for softwood lumber, its growth was particularly fast in the 1950's and 1960's. With the introduction of waferboards and oriented strand boards and their subsequent substitution for softwood plywood, however, consumption of those products increased more rapidly. Between 1976 and 1984, use of oriented strand board/waferboards, increased about 14 times, compared to about 14 percent for softwood plywood.

Projections of total structural panel consumption rise to 34.4 billion square feet in 2030, about 54 percent above 1984 use. All of the increase over the projection period is due to continued growth in oriented strand board/waferboard consumption, which is projected to reach 15.5 billion square feet by 2030, more than 5.5 times its use in 1984. After slowly declining through 2010, softwood plywood consumption increases to about 19.0 billion square feet in 2020 and 2030. As a result of these trends, oriented strand board/waferboard panels compose over 45 percent of total structural panel consumption in 2030, up sharply from about 12.5 percent in 1984.

Table 3.5—Structural panel consumption, exports, imports, and production in the United States, by type of panel, specified years, 1952–84, with projections to 2030

3/8-inch basis

Year	Consumption				Exports			Imports			Production		
	Total	Per capita	Softwood plywood	Other structural panels[1]	Total	Softwood plywood	Other structural panels[1]	Total	Softwood plywood	Other structural panels[1]	Total	Softwood plywood	Other structural panels[1]
	Billion square feet	*Square feet*	*Billion board feet*										
1952	3.2	20	3.2	—	(2)	(2)	—	(2)	(2)	—	3.2	3.2	—
1962	9.3	50	9.3	—	(2)	(2)	—	(2)	(2)	—	9.3	9.3	—
1970	14.0	68	14.0	(2)	0.1	0.1	—	(2)	(2)	(2)	14.1	14.1	—
1976	17.4	80	17.2	0.2	.7	.7	(2)	0.1	(2)	0.1	18.0	17.9	0.1
1984	22.4	95	19.6	2.8	.4	.4	(2)	.8	0.1	.7	22.0	19.9	2.1
							Projections						
Year	Total demand				Exports			Imports			Demand on U.S. mills		
1990	23.8	94	18.9	4.9	0.7	0.7	(2)	0.6	(2)	0.6	23.9	19.6	4.3
2000	26.4	96	18.1	8.3	.8	.8	(2)	.8	(2)	.8	26.4	18.9	7.5
2010	29.0	99	18.0	11.0	.9	.9	(2)	1.2	(2)	1.2	28.7	18.9	9.8
2020	33.0	107	19.0	14.0	1.0	1.0	(2)	1.6	(2)	1.6	32.4	20.0	12.4
2030	34.4	108	18.9	15.5	1.1	1.1	(2)	2.0	(2)	2.0	33.5	20.0	13.5

[1] Includes oriented strand board, waferboard, and composite veneer-particle panels.

[2] Less than 50 million square feet.

Note: Data may not add to totals because of rounding.

Sources: **Production:** *Softwood plywood:* 1952–76—U.S. Department of Commerce, Bureau of the Census. Softwood plywood. Curr. Ind. Reps. Ser. MA24H. Annual. 1984—American Plywood Association. Regional production and distribution patterns of the structural panel industry. Econ. Rep. E41. May 1986. **Other structural panels:** 1976—U.S. Department of Agriculture, Forest Service estimate. 1984—American Plywood Association. Regional production and distribution patterns of the structural panel industry. Econ. Rep. E41. May 1986. **Imports:** *Softwood plywood:* U.S. Department of Commerce, Bureau of the Census. U.S. imports for consumption and general imports: TSUSA commodity by country of origin. FT246. Annual. *Other structural panels:* U.S. Department of Agriculture, Forest Sevice estimates. **Exports:** *Softwood plywood:* U.S.Department of Commerce, Bureau of the Census. U.S. exports/schedule E, commodity by country. FT 410. Monthly. *Other structural panels:* U.S. Department of Agriculture, Forest Service estimates.

Projections: U.S. Department of Agriculture, Forest Service.

Nonstructural Panel Products—Nonstructural panels consumption, including hardwood plywood, insulating board, hardboard, and particleboard, rose to 16.6 billion square feet (3/8-inch basis) in 1984, more than 3.5 times total use in the early 1950's (table 3.6, fig. 3.5). Although all of the nonstructural panel products contributed to the increase, the most rapid growth was shown by particleboard and hardboard. Between 1952 and 1984, particleboard (including medium-density fiberboard) consumption rose from about 100 million to 8.1 billion square feet. Over the same period, hardboard use increased more than eightfold. Because of somewhat different market structures than hardboard and particleboard, both hardwood plywood and insulating board increased into the 1970's but declined by 1984.

Projected total demand for nonstructural panels increases to 20.3 billion square feet in 2020 and subsequently declines

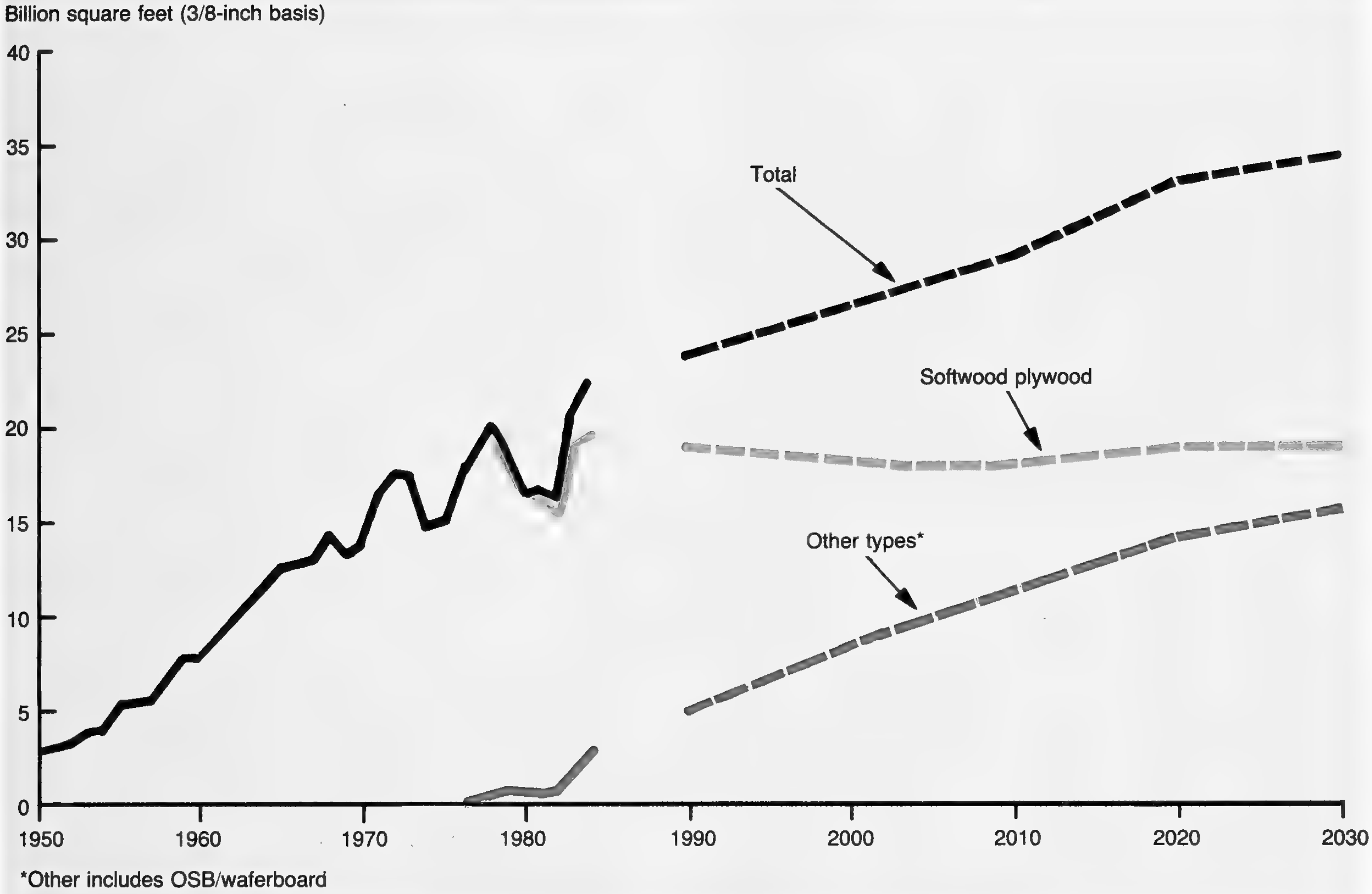


Figure 3.4—Structural panel consumption in the United States, by type, 1950–84, with projections to 2030

slightly to 20.2 billion in 2030. Because of trends in their major markets, as well as the assumptions about market penetration and product substitution discussed earlier, somewhat different trends in demand are projected for the various products. Insulating board, whose major market is residential construction, is projected to slowly decline. Hardwood plywood, used in manufacturing as well as construction, increases through 2030, while particleboard rises until 2010, shows no growth in the 2020's, and thereafter declines. Hardboard is the only nonstructural panel product to show a steady increase throughout the projection period.

Consumption and Projected Demands for Pulpwood—Pulpwood use in the United States has been increasing fairly rapidly over most of the past 100 years. Much of this growth has taken place since the early 1950's, a period in which consumption in U.S. mills has more than quadrupled, rising from about 27 million cords in 1952 to more than 91 million in 1984. As a result of this growth, currently over a third of the industrial roundwood harvested from domestic timberland is used as pulpwood.

Demand for pulpwood is a derived demand in the sense that is is determined by demands for paper, board, and other woodpulp-based products. Consumption of paper and board has risen from 28.7 million tons in 1950 to 77.6 million in 1984. Per capita consumption increased from 377 to 656 pounds over the same period.

Consumption of most major grades of paper and board has increased substantially in recent years. However, there have been large differences in the rates of growth. These differences have resulted from such factors as changes in consumer tastes, development of new pulp-based products, inroads of substitutes, and varying rates of growth in major sectors of the economy.

Table 3.6—Nonstructural panel consumption, exports, imports, and production in the United States, by type of panel, specified year 1952–84, with projections to 2030

3/8-inch basis

Year	Consumption						Exports					Imports					Production				
	Total	Per capita	Hardwood plywood	Insulating board	Hardboard	Particleboard[1]	Total	Hardwood plywood	Insulating board	Hardboard	Particleboard[1]	Total	Hardwood plywood	Insulating board	Hardboard	Particleboard[1]	Total	Hardwood plywood	Insulating board	Hardboard	Particleboard[1]
	Billion square feet	*Square feet*	*Billion board feet*																		
1952	4.7	30	1.3	3.0	0.3	0.1	0.1	([2])	0.1	([2])	([2])	0.1	0.1	([2])	([2])	([2])	4.7	1.2	3.1	0.3	0.1
1962	8.0	43	2.4	3.8	.9	.8	.1	([2])	.1	([2])	([2])	1.1	.9	0.1	0.1	([2])	7.0	1.5	3.8	.8	.8
1970	13.2	64	3.8	4.3	1.6	3.5	.2	.1	.1	([2])	([2])	2.3	2.0	.1	.2	([2])	11.0	1.8	4.3	1.4	3.5
1976	16.9	77	3.4	4.5	2.1	6.9	.4	.1	.1	0.1	0.2	2.7	2.4	.1	.2	.1	14.6	1.1	4.5	2.0	7.0
1984	16.6	70	2.4	3.7	2.5	8.1	.3	([2])	.1	.1	.1	2.3	1.5	.4	.3	.2	14.6	0.9	3.4	2.3	8.0
											Projections										
Year	Total demand						Exports					Imports					Demand on U.S. mills				
1990	17.7	70	3.0	3.7	2.7	8.3	0.4	([2])	0.1	0.1	0.2	3.3	2.3	0.4	0.3	0.3	14.8	0.7	3.4	2.5	8.2
2000	18.9	75	3.2	3.6	3.1	9.0	.4	([2])	.1	.1	.2	3.5	2.5	.4	.3	.3	15.8	.7	3.3	2.9	8.9
2010	19.5	77	3.2	3.6	3.5	9.2	.6	([2])	.1	.2	.3	3.7	2.5	.4	.4	.4	16.4	.7	3.3	3.3	9.1
2020	20.3	80	3.6	3.6	3.9	9.2	.6	([2])	.1	.2	.3	3.7	2.5	.4	.4	.4	17.2	1.1	3.3	3.7	9.1
2030	20.2	80	3.6	3.5	4.1	9.0	.6	([2])	.1	.2	.3	3.5	2.5	.3	.4	.3	17.3	1.1	3.3	3.9	9.0

[1] Includes medium-density fiberboard.

[2] Less than 500,000 square feet.

Note: Data may not add to totals because of rounding.

Sources:
Production: *Hardwood plywood.* 1952–84—U.S. Department of Commerce, Bureau of the Census. [Annually.] Current industrial reports series: hardwood plywood. M24F. Washington, DC: U.S. Department of Commerce, Bureau of the Census.
Insulating board and hardboard: 1952–84—U.S. Department of Commerce, Bureau of the Census. [Annually.] Current industrial reports series: pulp, paper, and board. M26A. Washington, DC: U.S. Department of Commerce, Bureau of the Census.
Particleboard: 1952–75—U.S. Department of Commerce, Bureau of the Census. [Annually.] Current industrial reports series: particleboard. M24L. Washington, DC: U.S. Department of Commerce, Bureau of the Census. 1976–84—National Particleboard Association. [Annually.] Particleboard and medium density fiberboard: annual production and shipments. Gaithersburg, MD: National Particleboard Association.
Exports: *Hardwood plywood, insulating board, and hardboard:* 1952–84—U.S. Department of Commerce, Bureau of the Census. [Monthly.] U.S. exports: schedule B commodity by country. FI 410. Washington, DC: U.S. Department of Commerce, Bureau of the Census. 1984—National Particleboard Association estimate.
Imports: *Hardwood plywood, insulating board, and hardboard:* 1952–84—U.S. Department of Commerce, Bureau of the Census. [Annually.] U.S. imports for consumption and general imports: TSUSA commodity by country of origin. FT 246. Washington, DC: U.S. Department of Commerce, Bureau of the Census.
Particleboard: 1952–76—U.S. Department of Commerce, Bureau of the Census. [Annually.] U.S. imports for consumption and general imports: TSUSA commodity by country of origin. FT 246. Washington, DC: U.S. Department of Commerce, Bureau of the Census. 1984—National Particleboard Association estimate.

Most paper is consumed in one form or another by individuals, with their level of use a function of their incomes. Consequently, there has been a close statistical relationship between changes in consumption of paper and changes in population and income. On the other hand, paperboard, which is used for packaging industrial and agricultural commodities, has been more closely related to changes in overall industrial and economic growth as determined by the gross national product. Trends in the the major pulp-based building board products—insulating board and hardboard—have been associated with the construction and manufacturing sectors, as described earlier.

On the basis of past relations and trends, total demand for paper, paperboard, and building board is projected to rise to about 102 million tons in 2000, and to more than 145 million tons in 2030—about 85 percent above consumption in 1984—although the rates of growth drop throughout the projection period. Projections of per capita demand also rise, reaching 908 pounds in 2030, 36 percent above per capita use in 1984.

In addition to changes in demand for paper and board, the amounts and kinds of fibrous materials used in its manufacture will strongly influence future demand for pulpwood. Since the 1920's, average use of fibrous materials per ton of all grades of paper and board produced has shown little variation, ranging from 0.984 to 1.092 tons.

Although the amount of fibrous materials used per ton of paper and board produced has shown little change, there have been changes in the mix of fibers consumed. For example, since the early 1950's, new woodpulp has risen from roughly two-thirds to around four-fifths of the total fibrous mix. Use of wastepaper, on the other hand, declined from approximately a third of the total fibers used to about 20 percent in 1984. All of this decline took place prior to the late 1960's, and since that time the percentage has shown no sustained upward or downward trend. Use of other fibers dropped from about 5 percent to less than 1 percent.

Despite the fact that there has been little change in the proportion of recycled fibers used over the past two decades, such factors as changing paper types, concerns about the environment, problems of solid waste disposal, and increasing competition for timber in some locations suggest future growth in wastepaper recycling. As a consequence, use of recycled fibers per ton of paper and board produced has been assumed to rise about 20 percent, to 0.24 tons per ton of paper and board produced in 2030. Projected use of new woodpulp drops to about 0.75 tons and use of other fibers is expected to show little change.

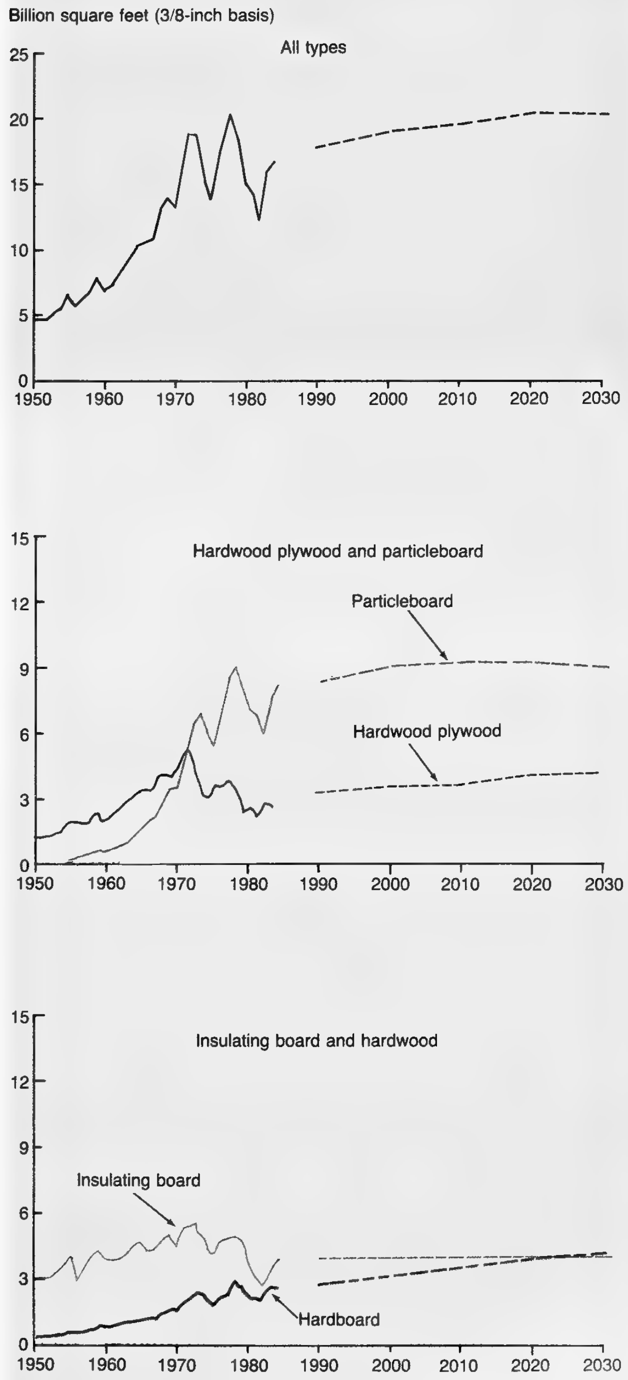


Figure 3.5—Nonstructural panel consumption in the United States, by type, 1950–84, with projections to 2030

The woodpulp industry's use of pulpwood has increased nearly fourfold since the early 1950's. As a result, consumption is now above 90 million cords a year. More than a third of all the industrial roundwood cut from domestic timberland is used as pulpwood.

With these trends, demand for woodpulp for the manufacture of paper and board rises fairly rapidly through the projection period, increasing about 75 percent, from 57.6 million tons in 1984 to 100.9 million tons in 2030.

Because of offsetting trends resulting from changes in pulping technology, grades of paper produced, and species of wood used, average consumption of pulpwood per ton of pulp produced has not changed significantly over the past 60 years. However, it has been assumed that the net effects of continuing technological developments and further increases in the use of high-yield hardwoods will cause a decline in consumption of pulpwood per ton of pulp produced, from an average of about 1.5 tons in the mid-1980's to 1.35 tons in 2030.

Given the above projections and assumptions, the demand for pulpwood in U.S. mills rises to 112.2 million cords in 2000, with a further increase to 142.3 million in 2030 (table 3.7, fig. 3.6). These volumes are, respectively, about 23 percent and 56 percent above the 91.4 million cords consumed in 1984. Part of the demand for pulpwood has been met by the use of slabs, edgings, veneer cores, and other byproducts produced at primary manufacturing plants. Between 1952 and 1984, use of such materials (including some purchased chips produced from roundwood) increased from 1.6 million to 36.8 million cords. Most of the economically available supplies of these materials are currently being utilized, either for pulp production, fuel, particleboard manufacture, or for export. Moreover, competition for any newly available supplies of byproducts is likely to intensify. Nonetheless, as a result of the projected growth in domestic lumber production, the volume of byproducts used for pulpwood is expected to increase by 11.6 million cords over the projection period. As a proportion of total pulpwood use, however, byproducts decline from about 40 percent in 1984 to just over 34 percent in 2030.

Consumption and Projected Demands for Other Industrial Timber Products—A variety of other industrial timber products, including poles; piling; posts; round mine timbers; bolts used for shingles, handles, and wood turnings; and chemical wood, is consumed in the United States. This total also includes roundwood used for oriented strand board or waferboard and particleboard not manufactured from byproducts. Total consumption of roundwood for these products amounted to an estimated 415 million cubic feet in 1984. This was somewhat below the general level of use in the 1950's and 1960's, when estimated consumption averaged more than 575 million cubic feet per year, and far below the 2 billion cubic feet consumed annually in the early 1900's.

Chips produced from slabs, edgings, veneer cores and other byproducts of primary wood-manufacturing plants, such as sawmills and veneer plants, are an important source of fiber for the woodpulp industry. Most of the economically available supplies of such material are now being utilized. In the future, the pulp industry must increasingly turn to roundwood for fiber.

Table 3.7—Pulpwood consumption, exports, imports, and production in the United States, specified years 1952–84, with projections to 2030

Million cords

				Production				
					Roundwood			
Year	Consumption	Exports	Imports	Total	Total	Softwoods	Hardwoods	Chips[1]
1952	27.2	([2])	2.1	25.0	23.5	20.0	3.5	1.6
1962	44.1	0.1	1.4	42.8	33.3	24.3	9.0	9.4
1970	69.6	2.0	1.1	70.5	50.2	36.7	13.6	20.2
1976	75.3	3.3	1.1	77.4	47.6	33.0	14.7	29.8
1984	91.4	1.9	1.8	91.5	54.8	34.7	20.0	36.8

Projections

				Demand for U.S. pulpwood				
					Roundwood from U.S. timberland			
Year	Demand in U.S. mills	Exports	Imports	Total	Total	Softwoods	Hardwoods	Plant by-products
1990	100.1	2.3	1.4	101.0	59.6	36.4	23.2	41.4
2000	112.2	1.9	1.3	112.8	69.2	39.2	30.0	43.7
2010	123.6	1.7	1.2	124.1	79.3	42.1	37.2	44.8
2020	133.8	1.6	1.1	134.3	86.8	43.6	43.2	47.5
2030	142.3	1.5	1.0	142.8	94.5	45.3	49.2	48.4

[1] Includes primary processing plant byproducts, such as slabs, edgings, and veneer cores, as well as unknown volumes of pulp chips produced directly from roundwood at logging sites and other locations remote from pulpmills.

[2] Less than 50,000 cords.

Note: Data may not add to totals because of rounding.

Source: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census; the American Paper Institute; and the American Pulpwood Association.

Projections: U.S. Department of Agriculture, Forest Service.

The long downward trend in the use of miscellaneous roundwood products appears to have bottomed out in recent years. Since the mid 1970's, consumption has been gradually increasing. Consequently, it has been assumed that demand for these products (including roundwood for oriented strand board, waferboard, and particleboard) will rise slowly to 1.0 billion cubic feet in 2030. Much of the increase is expected to come from expanding consumption of roundwood for these board products as competition for byproducts for use in their manufacture becomes more intense.

Consumption and Projected Demands for Fuelwood—Total fuelwood consumption in 1984 was an estimated 49 million cords, or about 3.9 billion cubic feet. Of the total, 46 percent, or 1.6 billion cubic feet, was roundwood harvested from growing stock trees. The remainder came from a variety of sources, including trees that grow on land other than timberland, such as fence rows and urban areas; rough, rotten, and dead trees on timberland; materials left in the forest after harvests; and plant byproducts. About 80 percent of the total harvested from growing stock was hardwoods.

Fuelwood was the major source of energy in the United States until the 1870's. However, over the next century fuelwood use dropped sharply, supplanted by fossil fuels and electricity. By 1970, less than 2 percent of all the households in the United States used wood (nearly all roundwood) as their primary heating fuel and less than 1 percent as

With the dramatic rise in fossil fuel prices that began in the mid-1970's, many households began to use wood for heating. By the early 1980's, 22 million households, over a quarter of all households, used fuelwood. Nearly 29 million households had wood-burning equipment.

their primary cooking fuel. Although there was some growth in the use of byproducts, bark, and similar materials by the wood-products industries in the 1960's—partially stimulated by increasing concerns about the environmental effects of waste disposal—their direct use of roundwood was small.

With the dramatic increases in fossil fuel prices in the 1970's and early 1980's, an increasing number of households began to use wood as the primary or as a secondary source of heat. By 1981, 22.2 million households (27 percent) used fuelwood and 28.7 million had wood-burning equipment installed in their homes. Wood products manufacturers and, to some extent, other industries, including utilities, also increased their use of wood, as a result of the increasing costs of using other fuels and factors such as the incentives contained in the National Energy Act of 1978 for cogeneration and use of fuels other than oil or gas.

Despite continuing relatively high levels of consumption, there are indications that the use of wood fuel for residential heating has slowed or declined in the past 2 years or so,

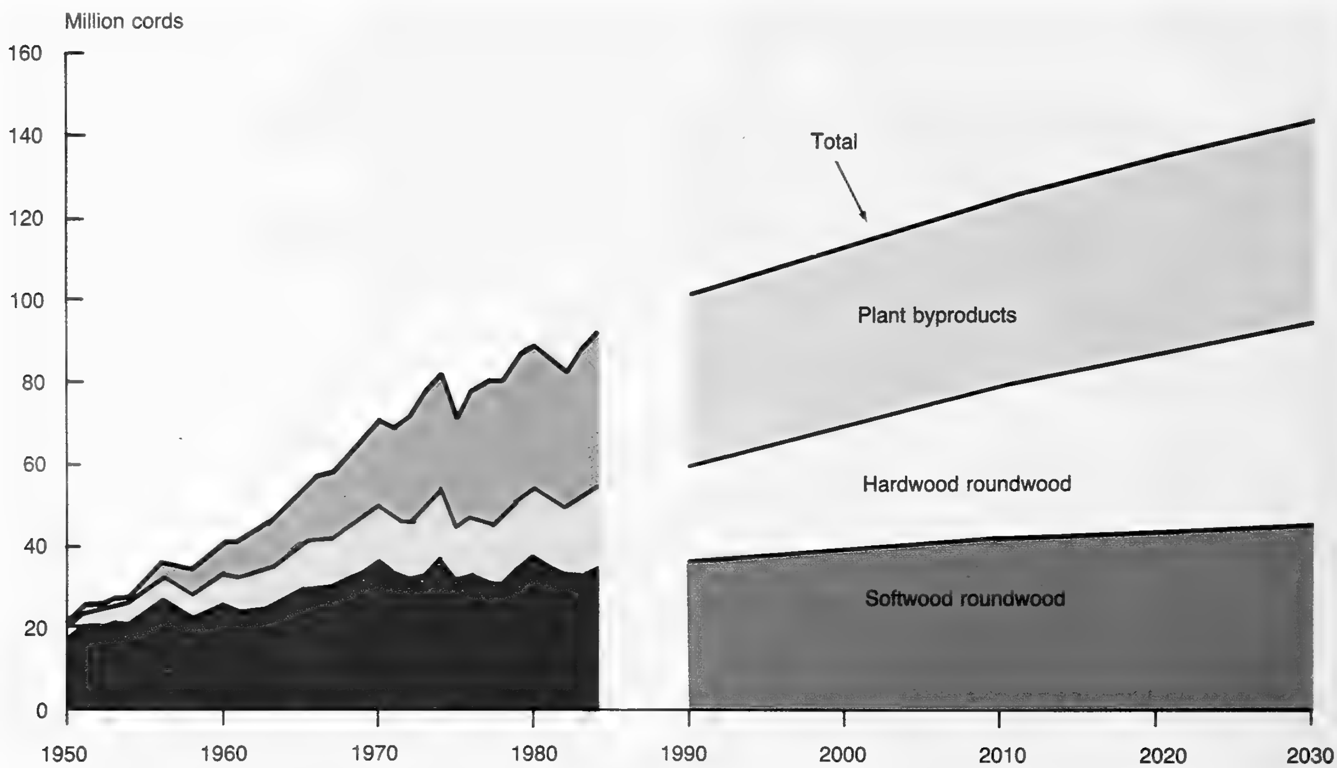


Figure 3.6—Pulpwood production in the United States, by source of material, 1950–84, with projections to 2030

as the prices of fossil fuels dropped from the peaks reached in the early 1980's. The extent of any change has not been quantified; however, many studies have shown that the increase in fossil fuel prices was the most important incentive for households to turn to wood as a source of heat energy in the 1970's. It is doubtful that there have been large effects on industrial wood use for heat and energy because of the equipment changes necessary in many cases and the difficulty of changing established patterns of supply.

In addition to the recent decline in fossil fuel prices, environmental considerations have had an impact on fuelwood use. Several areas have restricted residential woodburning because of air pollution problems. On the other hand, use of wood fuel already provides outlets for large quantities of mill byproducts and for some urban wood refuse, thus mitigating large waste-disposal problems. Moreover, producing fuel from logging residues, cull trees, and portions of overstocked stands would, in many cases, reduce fire hazards and improve the economic feasibility of intensive silviculture.

Projections based on an evaluation of the factors discussed above and on the assumptions about fossil fuel prices discussed earlier show fuelwood from growing stock sources rising to 35 million cords (2.8 billion cubic feet) in 2010 and remaining at that level in 2020 but subsequently dropping rapidly to 27.5 million cords (2.2 billion cubic feet) in 2030. This decline is expected as a result of increasing competition for the available growing stock resource for industrial roundwood products and associated rising prices.

Projected Demands for Timber—The projections of demand for timber products shown above have been presented, for the most part, in standard units of measure (board feet of lumber, square feet of panel products, cords of pulpwood and fuelwood, and cubic feet of miscellaneous industrial roundwood products). In order to compare demand for these products with projections of timber supplies, these projections must be converted to common units of measure—cubic feet of roundwood.

Improvements in Utilization—In recent decades, in response to rising stumpage costs, there have been substantial improvements in utilizing harvested timber. Improvements have involved increasing use of slabs, edgings, sawdust, veneer cores, shavings, and other similar material for pulp and particleboard. Various technological developments such as use of thinner saws and automatic patching and stitching in veneer mills have led to increased product yield per unit of wood input, although in the lumber industry this apparently has been offset by the use of smaller and lower quality material and the use of low-yield (lumber) equipment such as chipping head rigs. Yields in the pulp industry have been held down by a large rise in the production of bleached and semibleached pulps, which require more wood per ton of production. Countering this to some extent has been the increasing use of higher yield hardwoods and the development of improved pulping processes.

With respect to the future, it has been assumed that there will be continued significant improvements in roundwood product yields, amounting to 2 percent per decade over the projection period.

Demands for Roundwood—In 1984, total U.S. consumption of timber products in terms of roundwood volume was 16.7 billion cubic feet, excluding round fuelwood obtained from nongrowing-stock sources (table 3.8). This was more than 50 percent above average consumption in the early 1950's and materially larger than the levels attained in the early 1900's, when lumber use was at the previous high and record volumes of fuelwood were consumed.

A little less than half (47 percent) of the total volume consumed in 1984 consisted of sawlogs, almost a third (32 percent) was pulpwood, and about 9 percent each, fuelwood and veneer logs. The remainder consisted of other industrial roundwood products, including the roundwood used for oriented strand board, waferboard, and particleboard.

From the early 1950's to 1984, there was an almost 30-percent rise in the volume of sawlogs consumed, while round pulpwood nearly doubled, and veneer logs increased 3.8 times (fig. 3.7). Use of round fuelwood from growing stock rose 60 percent over the period, despite the drops in the 1950's and 1960's described earlier, and other industrial products stabilized in the 1970's after declining earlier. Total demand for roundwood products increases substantially over the projection period, rising more than 26 percent to 21.1 billion cubic feet in 2000 and continuing up to 22.3 billion in 2030. Although demand for each of the products is higher in 2030 than in 1984, pulpwood shows the largest rise. As described earlier, fuelwood use rises fairly rapidly to 2010, stabilizes, and subsequently declines.

Demand by Species Group—For most of the period between the early 1950's and 1984, consumption of softwood roundwood grew more rapidly than hardwoods. However, in the 1970's and early 1980's, in response to rising use of fuelwood (about four-fifths hardwoods), hardwood pulping, and increases in furniture and pallet manufacture (both major

Table 3.8—Roundwood consumption in the United States, by species group and product, specified years 1952–84, with projections of demand to 2030

Billion cubic feet, roundwood equivalent

Species group and product	Year					Projections				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Softwoods										
Sawlogs	5.0	4.8	4.9	5.5	6.6	7.3	7.3	7.5	7.7	7.6
Veneer logs	0.2	0.7	0.9	1.2	1.3	1.2	1.2	1.2	1.3	1.4
Pulpwood[1]	2.4	2.6	3.4	3.3	3.8	3.5	3.9	4.4	4.6	4.8
Miscellaneous products[2]	.3	.2	.2	0.2	0.3	0.4	0.4	0.5	0.5	0.6
Fuelwood[3]	.2	.1	.1	.1	.4	.5	.7	.8	.7	.5
Total[4]	8.1	8.4	9.5	10.5	12.4	12.9	13.6	14.4	14.8	14.9
Hardwoods										
Sawlogs	1.1	1.1	1.1	1.3	1.3	1.3	1.4	1.5	1.6	1.6
Veneer logs	.2	.2	.3	.3	.2	.2	.3	.3	.3	.3
Pulpwood[1]	.3	.7	1.0	1.1	1.4	1.6	2.1	2.6	3.0	3.5
Miscellaneous products[2]	.4	.2	.2	.1	.2	.2	.3	.4	.4	.4
Fuelwood[3]	.7	.4	.3	.3	1.2	1.9	1.9	2.0	2.1	1.7
Total[4]	2.7	2.6	2.9	3.1	4.3	5.2	6.0	6.7	7.4	7.4
All species										
Sawlogs	6.1	5.9	6.0	6.8	7.9	8.6	8.7	9.0	9.3	9.2
Veneer logs	.4	.9	1.2	1.5	1.5	1.4	1.4	1.4	1.5	1.7
Pulpwood[1]	2.7	3.3	4.4	4.4	5.3	5.1	6.0	7.0	7.6	8.3
Miscellaneous products[2]	.7	.5	.4	.4	.4	.6	.7	.9	.9	1.0
Fuelwood[3]	1.0	.5	.3	.3	1.6	2.4	2.6	2.8	2.8	2.2
Total[4]	10.9	11.1	12.3	13.5	16.7	18.1	19.6	21.1	22.2	22.3

[1] Includes both pulpwood and the pulpwood equivalent of the net imports of paper, board, and woodpulp.

[2] Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, roundwood used in particleboard manufacture, and other miscellaneous items.

[3] Data shown are estimates of fuelwood harvested from growing stock sources only.

[4] Includes imported logs not shown by product use.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census; the American Paper Institute; the American Pulpwood Association; the National Forest Products Association; the American Plywood Association; and the National Particleboard Association.

Projections: U.S. Department of Agriculture, Forest Service.

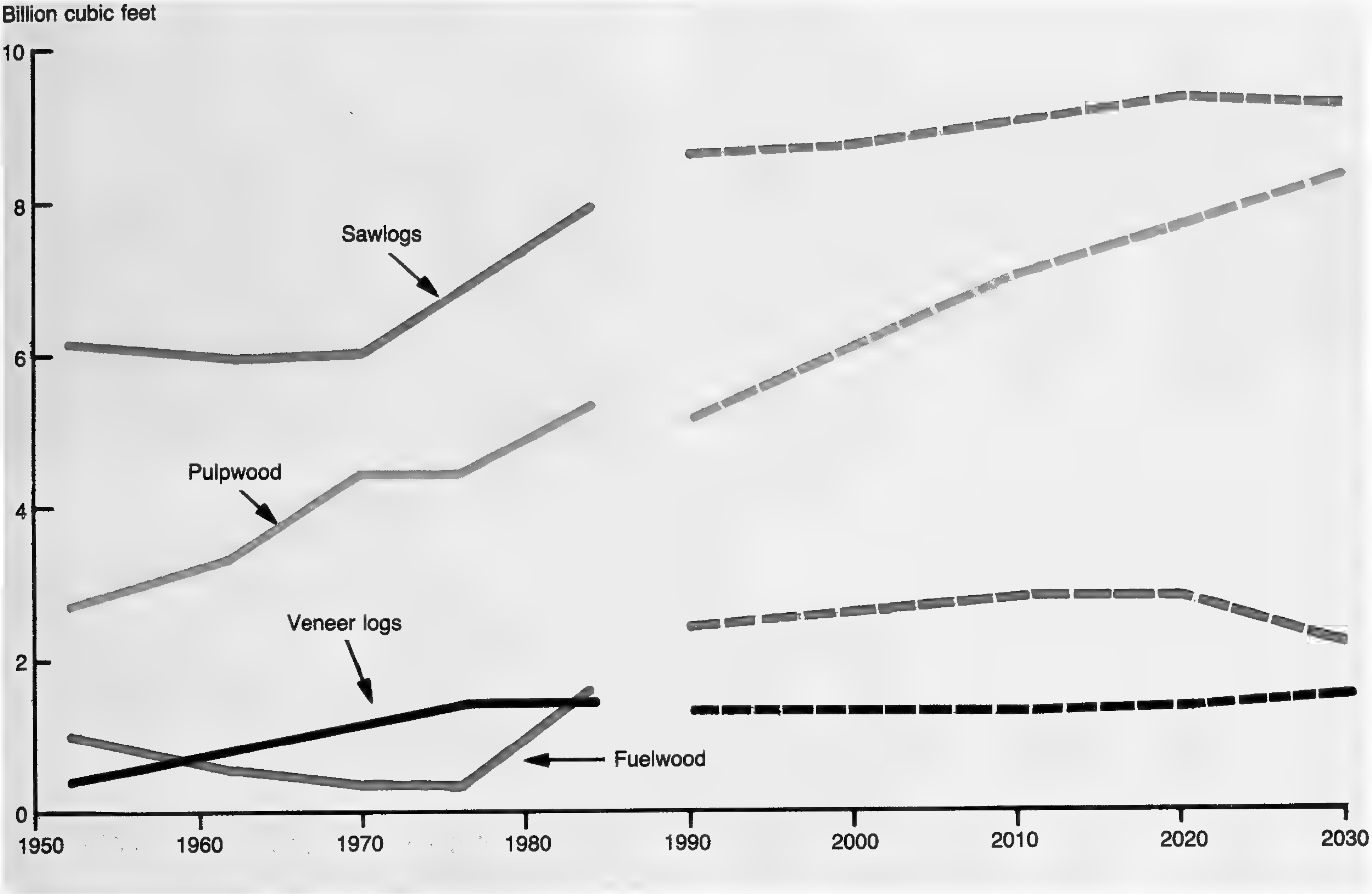


Figure 3.7—Roundwood consumption by product in the United States, 1952–84, with projections to 2030

hardwood markets), hardwood roundwood consumption rose most rapidly.

These trends are expected to continue, with demand for both hardwoods and softwoods rising through most of the projection period. By 2030, projected demand for softwoods is up 20 percent, to 14.9 billion cubic feet; however, hardwood demand rises 72 percent, to 7.4 billion. In 2030, about two-thirds of total demand is for softwoods and one-third hardwoods, compared to 74 and 26 percent, respectively, in 1984.

Trade in Timber Products

The United States is, at the same time, the world's leading importer of timber products and a major timber products exporter. The total value of all U.S. timber products imports in 1984 was $12.2 billion; exports were worth $7.2 billion.

Trends in imports and exports of the major wood products, lumber, panel products, and pulpwood in standard units of measure are shown in tables 3.4–3.7. When these various products are converted to roundwood equivalent, and the roundwood equivalent of pulp, paper, and board is included, it can be seen that U.S. imports and exports of timber-based products are large and have been increasing over the past three decades. For example, in 1984 total imports amounted to 4.2 billion cubic feet, triple the volume imported in 1952. Over the same period, exports rose about 10.5 times, to 2.1 billion cubic feet.

Projected Imports—Among the various products imported, softwood lumber, nearly all from Canada, is most important in terms of cubic volume. Between 1952 and 1984, softwood lumber imports rose from 2.3 billion to 13.3 billion board feet; however, a large part of this increase has taken place over the past decade. Projections show a further rise to 16.0 billion board feet in 1990. Current perceptions are

Between the early 1950's and 1984, the consumption of sawlogs increased by more than a quarter, round pulpwood use nearly doubled, and veneer log use nearly quadrupled. In the future, demand will continue to increase but at slower rates.

For a long time, the United States has been a net importer of many timber products. This situation is expected to continue, but the Nation will have to depend to an increasing degree on its domestic timber resources.

that that level of production in Canada probably cannot be sustained. As a consequence, softwood lumber imports have been projected to decline to about 11.8 billion board feet by 2030. Conversely, hardwood lumber imports are expected to increase slowly to 0.7 billion board feet over the projection period.

Imports of structural panels of oriented strand board or waferboard, also from Canada, increased rapidly in the late 1970's as demands outstripped the small, but growing, domestic industry's ability to produce them. Continued increases in imports are expected in the future, but they are likely to rise more slowly than in the past as the domestic industry continues to expand. Softwood plywood imports are small and are not expected to rise over the projection period.

Of the nonstructural panel products, imports of hardwood plywood are most important for domestic consumption. Currently, about two-thirds of all the hardwood plywood consumed in the United States is imported, chiefly from Taiwan and Indonesia. Imports from such sources have risen rapidly over the past three decades and are expected to continue to go up, but more slowly, in line with rising domestic demands. Imports of the other nonstructural panel products—insulating board, hardboard, and particleboard—have also increased since the early 1980's but are expected to continue at about current levels through 2030.

Imports of pulp products—pulp, paper and board, and pulpwood—have approximately doubled over the past 30 years, rising to the equivalent of about 1.9 billion cubic feet of roundwood. As demands continue to rise over the next 45 years, such imports should continue to increase. In line with domestic demands, however, the rates of growth are expected to slow through the projection period.

Imports of logs, both softwood and hardwood, are expected to be negligible.

Projected Exports—Like imports, softwood lumber exports have increased since the early 1950's. Most of the growth has consisted of shipments to Japan, South and Central America, and Western Europe, a trade that is expected to continue and to increase slowly as population and incomes in these countries and regions rise in the future. Hardwood lumber exports have also grown and should rise in the projection period.

Exports of softwood plywood, though showing some fluctuation, have trended up since the early 1970's and are expected to continue to rise further as European markets grow and other markets open up. Exports of oriented strand board and waferboard have been, and are expected to remain, small in the projection period.

Hardwood plywood exports, which have generally been less than 0.5 billion square feet over the past 35 years, are expected to remain small through 2030. Insulating board exports have been relatively constant since the early 1950's and are expected to remain at about 0.1 billion square feet over the projection period. In contrast, exports of both hardboard and particleboard are expected to increase slowly in response to growth in the major offshore markets.

In 1984, the roundwood equivalent of the exports of all pulp products amounted to about 0.9 billion cubic feet. Though only about half as large as the volume of similar imports, exports of these products have also been moving up slowly since the early 1950's. Such trends are expected to continue over the projection period.

Exports of softwood logs—largely from the Pacific Northwest to Japan and, more recently, to China—have been the subject of some controversy and restrictions in the past. Exports in 1984 amounted to about 3.4 billion board feet, down from a peak 3.8 billion in 1979. Projections of future softwood log exports remain near present levels until about 2000 and subsequently decline modestly through the decades until 2030. This outlook is consistent with expected declines in future Japanese housing markets, and potentially expanded softwood supplies from Chile, New Zealand, and the Soviet Union after 2000. The ultimate impact of demands from the People's Republic of China, currently about half as large as shipments to Japan, is difficult to assess at this time. However, total exports to all offshore markets in the future are likely to be affected by prospective decreased supplies of high quality old-growth softwood timber in the Pacific Northwest. Exports of hardwood logs, about 25 million cubic feet in 1984, are projected to be less than 50 million in the projection period.

Projected Trends in Total Trade—As a result of the projected trends in imports of the various timber products discussed above, total imports, currently at about 4.2 billion cubic feet, roundwood equivalent, are expected to rise to 4.7 billion in 2010, and subsequently fall to 4.4 billion in 2030 (table 3.9). These trends are the result of declining softwood product imports after 2010, largely due to the projected drop in softwood lumber imports from Canada.

Total hardwood imports are projected at 0.5 billion cubic feet in 2030, up 67 percent from the volume shipped in 1984.

Projected total exports increase about 14 percent to 2.4 billion cubic feet in 2030, despite no prospective sustained growth in softwood shipments.

Exports of hardwood products are projected to rise 75 percent, to about 0.7 billion cubic feet over the projection period.

With these projections of timber products imports and exports, there will be only a modest overall decline in net imports into the United States, from 2.1 billion cubic feet in 1984 to 3.0 billion cubic feet in 2030. All of the decline takes place at the end of the projection period.

Demands on U.S. Timberland

Given the above projections of total demands and net imports, demands on U.S. timberland increase sharply over the next 45 years, rising about 39 percent, from 14.6 billion cubic feet in 1984 to 20.3 billion in 2030 (table 3.9, fig. 3.8). Demands for both softwoods and hardwoods increase; however, in line with projected trends discussed above, hardwood demand rises somewhat more rapidly. Between 1984 and 2030, demand on U.S. timberland for hardwoods is projected to increase about 73 percent, to 7.6 billion cubic feet. Demands on U.S. timberland for softwoods during the same period grow about 23 percent, to 12.7 billion cubic feet.

In summary, these base projections show that domestic and export demands can be expected to grow fairly rapidly over the next four and a half decades. Taken together, these demands increase about 31 percent, to 24.7 billon cubic feet, roundwood equivalent, in 2030. At the same time, prospective imports are projected to be only slightly larger. As a consequence, in the future the United States must look to its domestic timber resources to meet a larger proportionate share of its demands for timber products.

These national demands are part of the data needed to estimate timber demand–supply equilibrium by geographic sections and regions using the analytical systems described above. It is also necessary to estimate timber supplies.

Assumptions on Area of Timberland

Changes in the area of timberland—land capable of growing at least 20 cubic feet of industrial wood per acre per year

Table 3.9—Timber demand, exports, imports, and demand on timberland in the United States, by species group, specified years 1952–84, with projections to 2030

Billion cubic feet

Item	Year					Projections				
	1952[1]	1962[1]	1970[1]	1976[1]	1984[1]	1990	2000	2010	2020	2030
Softwoods										
Total demand[2]	8.1	8.4	9.5	10.5	12.4	12.9	13.6	14.4	14.8	14.9
Exports[3]	0.1	0.4	1.3	1.6	1.7	1.8	1.8	1.7	1.7	1.7
Imports	1.3	1.7	2.1	2.5	3.8	4.1	4.1	4.3	4.0	3.9
Demand on U.S. timberland[4]	6.9	7.1	8.7	9.5	10.3	10.6	11.3	11.8	12.5	12.7
Hardwoods										
Total demand[2]	2.7	2.6	2.9	3.1	4.3	5.2	6.0	6.7	7.4	7.4
Exports[3]	([5])	.1	0.2	0.2	0.4	0.4	0.5	0.6	0.6	0.7
Imports	.1	.2	.3	.3	.3	.3	.4	.4	.5	.5
Demand on U.S. timberland[4]	2.6	2.5	2.8	3.0	4.4	5.3	6.1	6.9	7.5	7.6
All species										
Total demand[2]	10.9	11.1	12.3	13.5	16.7	18.1	19.6	21.1	22.2	22.3
Exports[3]	.2	.5	1.5	1.9	2.1	2.2	2.3	2.3	2.3	2.4
Imports	1.4	1.9	2.4	2.8	4.2	4.4	4.5	4.7	4.5	4.4
Demand on U.S. timberland[4]	9.7	9.7	11.4	12.6	14.6	15.9	17.4	18.7	20.0	20.3

[1] Data are estimates of actual consumption and harvests.

[2] Total demand for products converted to a roundwood equivalent basis. The projections include adjustments for increased product yields per unit of roundwood input that are expected to result from improvements in utilization.

[3] Logs and those products manufactured directly from roundwood, including pulp and pulp products.

[4] Total U.S. demand plus exports minus imports.

[5] Less than 50 million cubic feet.

Note: Data my not add to totals because of rounding.

Sources: Data for 1952–84 derived from data published by the U.S. Department of Commerce, Bureau of the Census; the American Paper Institute; the American Pulpwood Association; the National Forest Products Association; the American Plywood Association; and the National Particleboard Association.

Projections: U.S. Department of Agriculture, Forest Service.

Demands on U.S. timberlands are expected to rise from 14.6 billion cubic feet in 1984 to 20.3 billion in 2030. Demand goes up for both softwoods and hardwoods; however, in line with recent trends, it goes up more rapidly for hardwoods.

and not reserved for other uses—are major determinants of changes in timber supplies, net annual growth, inventory, and other components of the timber resource. Changes in area by ownership, forest management type, and site are also important.

Past Changes in Timberland Area—Although data for some States where forest surveys had been completed were available in the 1930's, there were no statistically accurate estimates of area of timberland in the South prior to 1952, the year when data from surveys of all Southern States were first compiled. The general trends in timberland area, however, are fairly clear. Originally, nearly all of the South was forested. As settlement spread and increasing areas were cleared for crops, pastures, and a variety of other uses such as cities and roads, area in timberland declined (Healy 1985).

This decline accelerated in the late 1800's, when large sawmills moved into the South and began harvesting the old-growth forests. By the early 1920's, nearly all the old-growth forests had been cut, and programs to protect and regenerate forests were getting underway. About the same time, an agricultural recession and the effects of the boll weevil on cotton, the region's main cash crop, led to the abandonment of much cropland and pasture. These developments led to a reversal of the long downward trend: the area of timberland began to increase.

In the depression years of the 1930's and after World War II, additional large areas went out of use for crops and pasture. Protection programs, especially those against fire, were also expanding and becoming more effective. Given protection from fire and animals, extensive areas of idle cropland and pasture came back to trees, the natural climax

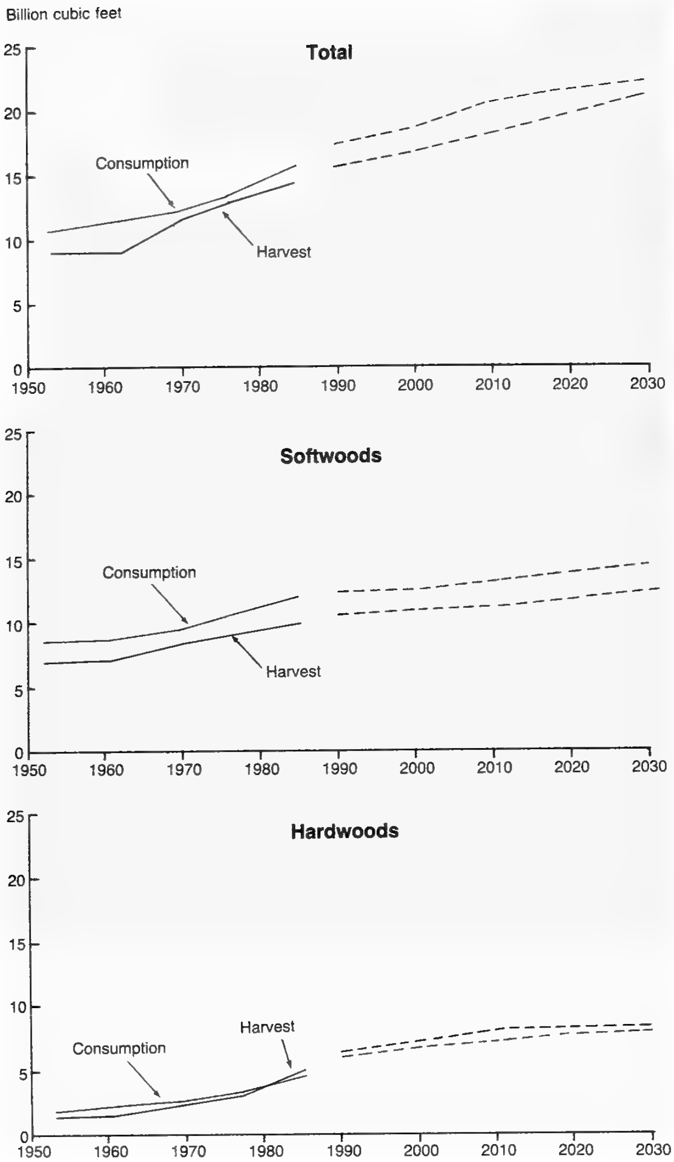


Figure 3.8—Roundwood consumption and harvests in the United States, 1952–84, with projections of demand and supplies to 2030

vegetation on nearly all of the land in the South. Much of it came back to pine, the pioneer tree species (first to become established) on the Coastal Plain and Piedmont.

By 1952, some 193 million acres, or nearly three-fifths of the land area in the South, were classified as timberland (table 3.10). There were further increases in the following years to a total of 197 million acres in 1962. Although the 1962 figure was undoubtedly far less than the original area of timberland, it probably represented the highest acreage in forests in the 20th century. Sometime in the early 1960's, the area of timberland began to decline, and this decline has

Much of the South's second and third forests regenerated naturally on cutover land and idle cropland and pasture. Much of it came back to pine, the pioneer tree species, the first to become established when seed sources are present.

continued. As of January 1, 1985, the total area of timberland in the South is estimated at just over 182 million acres.

Approximately 85 million acres of the timberland in the South are in the States in the Southeast—Florida, Georgia, North Carolina, South Carolina, and Virginia—and 97 million acres are in the South Central region—Alabama, Arkansas, Louisiana, Mississippi, Oklahoma, Tennessee, and Texas. Generally, trends since 1952 have been similar in both the regions and in the States; but more of the decline, 7 million out of 11 million acres, was in the South Central region (Birdsey and McWilliams 1986). By State, the biggest losses in timberland occurred in Florida, where relatively large increases in population have taken place, and in Arkansas and Louisiana, where large areas of forest in river bottomland have been diverted to cropland and other uses.

One major cause of the drop in area has been the conversion of timberland to cropland and pasture. Clearing for soybeans in the delta areas of the South Central region has been particularly important and has had substantial impacts on the bottomland hardwood resource. Other major factors include the continuing increase in urban areas and other related uses. The periodic forest surveys indicate that urban and built-up uses in the South have expanded by 20 million acres since 1952. Interregional population shifts and migration of industry to the Sun Belt States have contributed to this increase. In recent decades, in particular, the South has experienced relatively high growth rates in population and personal income.

Table 3.10—Area of timberland, by ownership and forest management type in the South, selected years 1952–85, with projections to 2030[1]

Thousand acres

Ownership and forest management type	Year					Projections				
	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
National forest										
Pine plantations	239	468	473	450	583	764	1,193	1,462	1,651	1,788
Natural pine	3,765	3,844	3,878	3,814	3,460	3,259	2,827	2,694	2,656	2,637
Mixed pine–hardwoods	1,536	1,530	1,651	1,740	1,841	2,021	2,337	2,390	2,387	2,361
Upland hardwoods	4,121	4,258	4,244	4,446	4,430	4,354	4,147	4,016	3,923	3,866
Bottomland hardwoods	708	612	489	460	459	436	403	404	409	411
Total	10,369	10,712	10,735	10,910	10,773	10,834	10,906	10,966	11,026	11,062
Other public										
Pine plantations	97	252	341	407	580	674	879	1,015	1,101	1,158
Natural pine	2,363	2,475	2,240	2,098	1,969	1,961	1,750	1,631	1,566	1,528
Mixed pine–hardwoods	954	874	972	930	955	954	1,070	1,122	1,148	1,163
Upland hardwoods	1,581	1,611	1,895	1,844	1,936	1,924	1,909	1,910	1,907	1,907
Bottomland hardwoods	1,596	1,458	1,439	1,546	1,803	1,855	1,851	1,856	1,856	1,864
Total	6,591	6,670	6,887	6,825	7,243	7,368	7,456	7,534	7,578	7,622
Forest industry[2]										
Pine plantations	660	3,127	5,714	8,723	13,153	16,039	22,343	25,031	26,269	26,972
Natural pine	14,576	13,646	13,357	11,340	8,818	7,564	4,613	3,569	3,314	3,252
Mixed pine–hardwoods	4,955	5,170	6,342	6,395	6,025	4,896	3,230	2,792	2,709	2,648
Upland hardwoods	5,814	6,469	6,229	6,655	7,118	6,865	6,022	5,405	5,062	4,859
Bottomland hardwoods	7,379	7,386	6,774	6,996	7,148	7,192	6,718	6,251	5,901	5,648
Total	33,384	35,798	38,416	40,109	42,263	42,555	42,926	43,048	43,254	43,378
Other private:										
Farmer										
Pine plantations	(3)	(3)	(3)	1,778	1,719	2,240	3,391	3,995	4,337	4,541
Natural pine	(3)	(3)	(3)	11,839	8,017	7,188	5,637	4,814	4,411	4,197
Mixed pine–hardwoods	(3)	(3)	(3)	7,585	5,471	4,820	3,958	3,593	3,302	3,129
Upland hardwoods	(3)	(3)	(3)	21,273	17,742	16,020	13,771	12,660	11,857	11,300
Bottomland hardwoods	(3)	(3)	(3)	8,397	6,743	5,879	4,908	4,422	4,086	3,821
Total	(3)	(3)	(3)	50,872	39,692	36,147	31,665	29,484	27,993	26,990
Corporate										
Pine plantations	(3)	(3)	(3)	1,088	1,393	1,928	3,244	4,049	4,506	4,780
Natural pine	(3)	(3)	(3)	3,647	3,848	3,977	3,493	3,219	3,136	3,149
Mixed pine–hardwoods	(3)	(3)	(3)	1,771	1,961	2,082	2,292	2,415	2,474	2,517
Upland hardwoods	(3)	(3)	(3)	3,922	5,021	5,491	6,207	6,761	7,127	7,391
Bottomland hardwoods	(3)	(3)	(3)	3,456	3,952	4,153	4,244	4,353	4,442	4,469
Total	(3)	(3)	(3)	13,884	16,175	17,631	19,479	20,796	21,687	22,306
Other individual										
Pine plantations	(3)	(3)	(3)	2,977	3,456	4,664	7,367	8,642	9,079	9,219
Natural pine	(3)	(3)	(3)	16,502	14,853	14,119	11,274	9,675	8,834	8,472
Mixed pine–hardwoods	(3)	(3)	(3)	10,424	10,655	10,016	9,783	9,599	9,295	9,065
Upland hardwoods	(3)	(3)	(3)	24,005	26,967	26,330	26,265	26,121	25,894	25,473
Bottomland hardwoods	(3)	(3)	(3)	10,006	10,087	10,343	10,520	10,362	10,154	9,943
Total	(3)	(3)	(3)	63,914	66,018	65,472	65,210	64,398	63,254	62,173

Table 3.10—Area of timberland, by ownership and forest management type in the South, selected years 1952–85, with projections to 2030[1]—Continued

Thousand acres

Ownership and forest management type	Year					Projections				
	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
Total other private										
Pine plantations	850	3,740	5,616	5,843	6,568	8,832	14,002	16,686	17,922	18,540
Natural pine	51,283	44,943	37,217	31,988	26,718	25,284	20,404	17,708	16,381	15,818
Mixed pine–hardwoods	19,643	19,927	20,220	19,780	18,087	16,918	16,033	15,607	15,071	14,711
Upland hardwoods	43,866	48,764	49,188	49,200	49,730	47,841	46,243	45,542	44,878	44,164
Bottomland hardwoods	27,064	26,497	23,033	21,859	20,782	20,375	19,672	19,137	18,682	18,233
Total	142,706	143,871	135,274	128,670	121,885	119,249	116,353	114,679	112,935	111,467
Total, all ownerships										
Pine plantations	1,846	7,587	12,144	15,423	20,884	26,309	38,417	44,194	46,943	48,458
Natural pine	71,987	64,908	56,692	49,240	40,966	38,068	29,594	25,602	23,917	23,235
Mixed pine–hardwoods	27,088	27,501	29,185	28,845	26,908	24,789	22,670	21,911	21,315	20,883
Upland hardwoods	55,382	61,102	61,559	62,145	63,214	60,984	58,321	56,873	55,770	54,796
Bottomland hardwoods	36,747	35,953	31,732	30,861	30,192	29,858	28,644	27,648	26,848	26,156
Total	193,050	197,051	191,312	186,514	182,164	180,006	177,641	176,227	174,793	173,527

[1] Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, 1985, and the projection years are as of January 1.

[2] Includes timberland leased or under management contracts to forest industry from other owners for periods of one forest rotation or longer. Timberland under cutting contracts is not included.

[3] Data for these other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Projected Changes in Timberland Area—Many of the forces that have caused the recent changes in area of timberland will surely continue to influence changes in the future. Thus, in making projections of area changes, it has been assumed that determinants such as population, income, agricultural productivity, agriculture exports, and prices of agricultural crops and timber products would continue to influence land-use changes (Alig 1985).

The projections of timberland area change for the South were derived from a regional econometric analysis of historical relationships among major land uses and key variables discussed above (Alig 1986). Area projections by State were developed by using State-specific values for the independent variable(s) in the regional land-use equations. Land areas for all major uses were projected simultaneously, with constraints imposed to assure that the sum of all uses equaled total land area.

For each of the key variables, assumptions about future trends were made. The assumptions on population and income are shown in table 3.2 in the preceding section on basic assumptions. Assumptions pertaining to the future rate of change in agricultural productivity and associated land incomes were derived from the Soil Conservation Service's analysis "1980 Appraisal: Soil, Water and Related Resources in the United States" (USDA Soil Conservation Service 1982). Crop yields were assumed to increase by 1.1 percent annually up to 2000 and then slow down somewhat. Real product prices for agricultural products are assumed to remain essentially constant over the projection period. Timber product prices rise in line with the base projections in this study. It was also assumed that there would be slow increases in the export of agricultural products.

Modeling area changes in timberland for this study proceeded in two stages. In the first stage, area changes for private forest ownerships were projected as part of the simultaneous projection of all land uses. Projections of public forest area were external to the model and were based on the expert opinions of Forest Service personnel involved in the management and acquisition of public lands in the South.

In the second stage of the area modeling, area changes were projected for forest management types by ownership. Area changes for forest management types reflect influences of both natural successional forces and land management activities or disturbances (Alig and Wyant 1985). Projections of area changes by management types are also important because they reflect differences in management practices

among ownerships and among States. They directly reflect tree planting, one of the chief indicators of management intensity.

Area change projections by forest management type were based on assumptions about the probability that a particular acre will receive a certain type of management (including the probability of no active management) and the associated probabilities that an acre so managed will remain in the same forest type or will make the transition to other forest types.

Preliminary projections of timberland area derived from the econometric system and the assumptions described above were reviewed by the State Foresters and members of the State study groups established in each State to provide assistance in this study (see Acknowledgments). The econometric system and the projections were also reviewed by technical experts from the Forest Service, forest industries, and forestry schools.

Thus, the projections of changes in area shown in table 3.10 are the product of the analytical system and assumptions modified by the judgment of experts from the major forestry interests in the South and in each State. The resulting projections (table 3.10 and app. tables 3.1–3.14) show a slow declining trend. Total timberland area, for example, drops from about 182 million acres in 1985 to 174 million acres in 2030. The South Central region and Southeast are both projected to sustain a 4-million-acre reduction in forest area (app. tables 3.1 and 3.2).

The projections also show a downward trend in almost all States (figs. 3.9 and 3.10, app. tables 3.3–3.14). In some States such as Florida, Georgia, and Arkansas, where substantial relative increases in population and economic activity are expected, the drop in timberland acreage is fairly large. In most of the other States, projected changes are small. In some States, the area of timberland is projected to rise or essentially remain constant in the latter part of the projection period.

The projected net area changes largely reflect the direct conversion of timberland to urban and developed uses, and other acres converted to replace cropland lost to urban and developed uses. The area of cropland is projected to remain essentially constant, while urban and related uses go up from 51 million to 64 million acres. The pasture and range area, on the other hand, is projected to drop by about 7 million acres, a response in part to a continuing decline in per capita domestic consumption of red meat, which affects livestock prices.

Table 3.11—Timberland with high or medium potential for conversion to cropland[1] in the South, by State and region, 1982

Thousand acres

Region and State	Conversion potential to cropland: High	Medium
Southeast		
Florida	185	1,021
Georgia	775	2,439
North Carolina	1,150	4,155
South Carolina	117	1,070
Virginia	279	1,997
Total	2,506	10,682
South Central		
Alabama	499	2,287
Arkansas	251	979
Louisiana	390	1,734
Mississippi	400	1,333
Oklahoma	43	365
Tennessee	402	1,044
Texas	35	450
Total	2,020	8,192
Total South	4,526	18,874

[1] The potential for conversion to cropland was determined by a multiagency group in each county as part of the National Resources Inventory process. The group considered the type of action necessary for conversion, commodity prices, costs of development and production, and other conditions affecting conversion to cropland as of 1980. Land was judged to have a high, medium, low, or zero potential for conversion to cropland over the next 10 to 15 years based on these factors and conversion rates for similar tracts of land in the past.

Source: U.S. Department of Agriculture, Soil Conservation Service, National Resources Inventory, 1982.

Uncertainty is always associated with projections of land use, and at the present time the outlook for cropland needs seems especially uncertain. For example, about 23 million acres of timberland in the South have high or medium potential for conversion to cropland (table 3.11). Although this land is concentrated to some extent in the States with coastal plains, there are substantial acreages in all States. If agricultural export demands increase more than currently expected, or if crop yields increase at slower rates than assumed, all or a substantial part of this area could be cleared and used for crops.

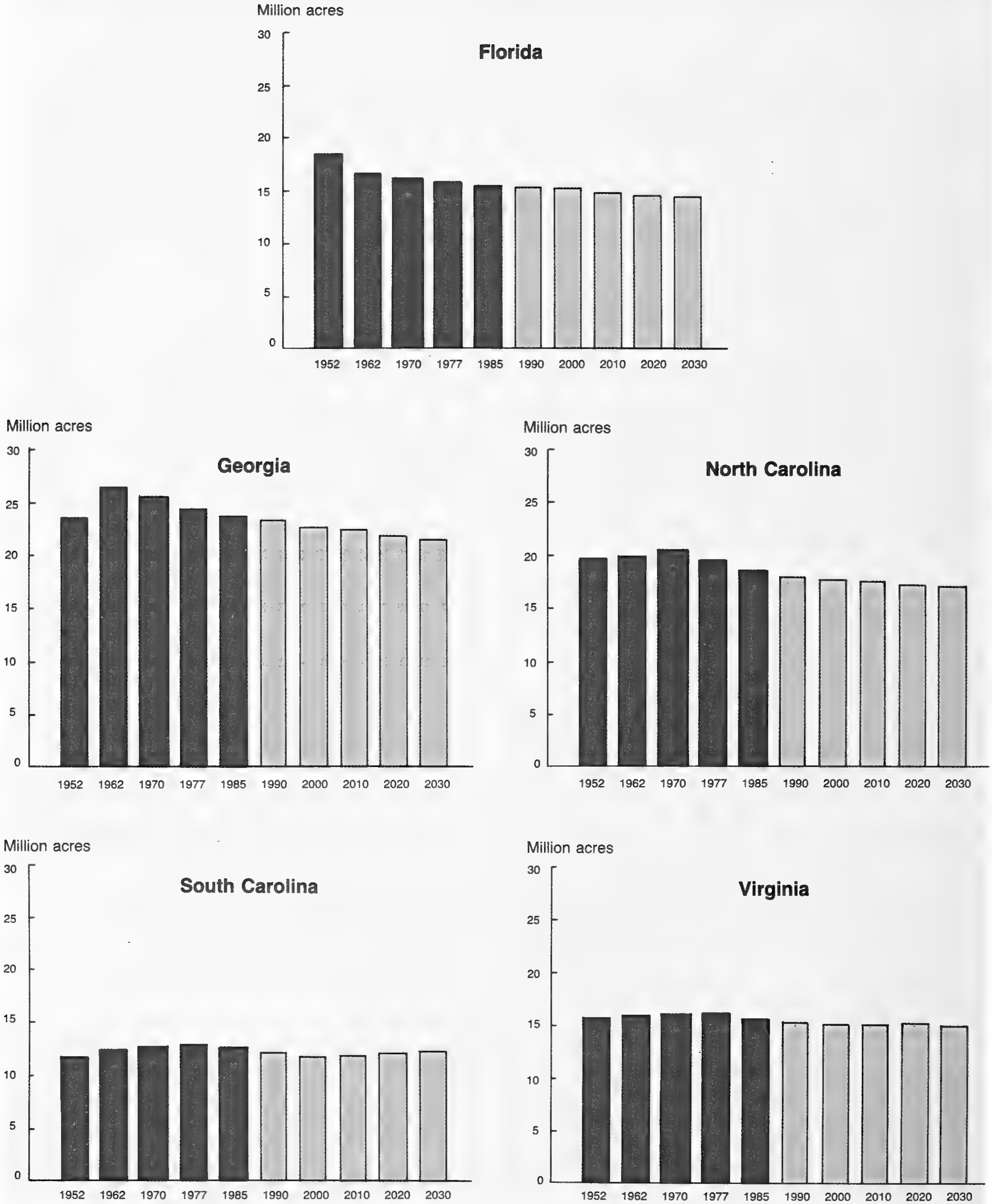


Figure 3.9—Timberland area in the Southeast region, by State, 1952–85, with projections to 2030

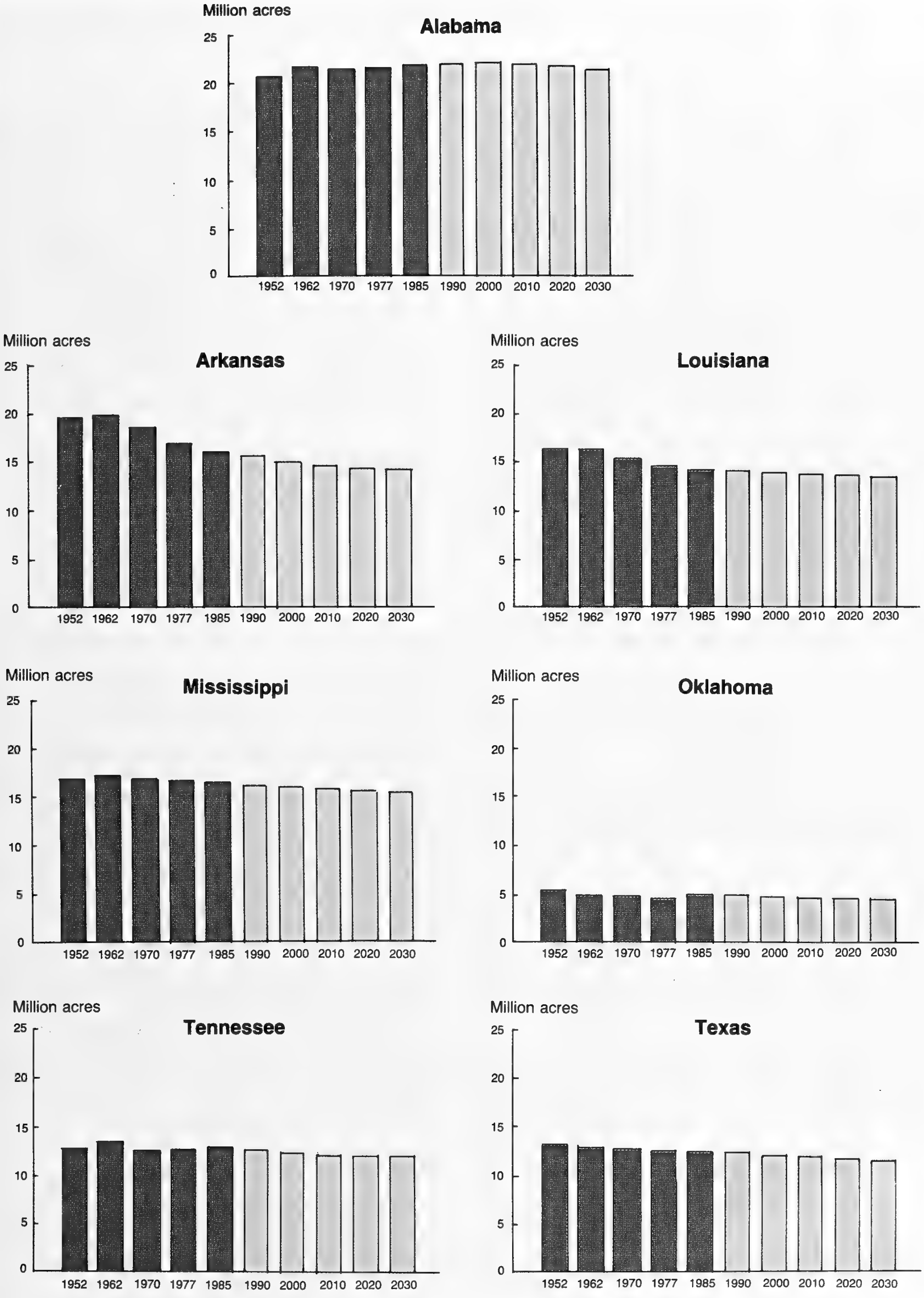


Figure 3.10—Timberland area in the South Central region, by State, 1952–85, with projections to 2030

Part of the uncertainty associated with the projections of land use include the implementation of provisions of the Food Security Act of 1985 (Farm Bill). Three major provisions of the Farm Bill may significantly impact forest area in the South: (1) the Conservation Reserve Program, (2) swampbuster and sodbuster provisions, and (3) the conservation compliance provision (Moulton and Dicks 1987).

About 8 million acres of highly erodible land in the South are suitable for forestation (table 3.12). Most Southern States have substantial acreages of this land and, under the Conservation Reserve Program of the 1985 Farm Bill, it is assumed that about 3 million acres would be planted to trees by 1990. There is a total of 22 million acres of marginal cropland and pasture in the South, including the highly erodible land, that would yield higher rates of return to the owners in pine plantations (table 3.13). This land, distributed in fairly large acreages through most Southern States, would be another logical source of land for Conservation Reserve Programs or for programs to increase timber supplies.

Impacts of the "buster" and compliance provisions are more difficult to project because of possible changes in government commodity subsidy and loan programs that would alter the attractiveness of converting erodible land to crop use.

Table 3.12—Area of highly erodible cropland[1] suitable for tree planting in the South, by region and State

Thousand acres

Region and State	Area suitable for tree planting
Southeast	
Florida	52
Georgia	659
North Carolina	1,047
South Carolina	299
Virginia	1,058
Total	3,115
South Central	
Alabama	851
Arkansas	583
Louisiana	75
Mississippi	1,022
Oklahoma	56
Tennessee	1,287
Texas	755
Total	4,629
Total South	7,744

[1] Cropland classified by the U.S. Department of Agriculture, Soil Conservation Service in land capability classes 3e, 4e, 6e, and 7e and also suitable for planting to trees.

Table 3.13—Area of cropland and pasture in the South, including highly erodible cropland, that would yield higher rates of return in pine plantations

Thousand acres

Region and State	Area suitable for tree planting
Southeast	
Florida	1,354
Georgia	1,864
North Carolina	2,115
South Carolina	745
Virginia	2,745
Total	8,823
South Central	
Alabama	2,456
Arkansas	1,956
Louisiana	521
Mississippi	2,526
Oklahoma	800
Tennessee	3,258
Texas	1,615
Total	13,132
Total South	21,955

Next to the Conservation Reserve Program, the conservation compliance provision could have the largest impact on timberland area in the South. Existing cropland identified as highly erodible will be subject to conservation compliance, some of which will be treated under the Conservation Reserve Program. If farmers do not comply, they could lose government subsidies on all acres. The South has between 2 million and 4 million acres of cropland in this category, all of which conceivably could be shifted to forest. The maximum addition to timberland under this Farm Bill provision would amount to approximately 2 percent of the existing timberland in the South.

There is no way of knowing how the timberland with potential for use as cropland or pasture or the marginal cropland and pasture suitable for pine plantations will be used in the future. There could be either a substantial further reduction in timberland area or a substantial increase. In the following chapter, two alternative futures are simulated that show the effects of converting all the timberland with high or medium potential for conversion to cropland, and of

planting to trees all of the cropland and pasture that would yield higher rates of return in pine plantations. As described in that chapter, either of these alternatives would have major impacts on the timber resource situation in the South.

Projected Changes by Ownership—Private owners have controlled most of the southern timberland base for several centuries. The land-use and management decisions of these owners have had a great impact on the southern timber situation.

Currently, approximately 90 percent of the South's timberland is privately owned. This percentage has changed little since the first surveys of the South's forest resources. Area changes among the major groups of owners—forest industry and other private ownerships (which includes farmer, corporate, and other individual ownerships)—have been substantial (table 3.10, fig. 3.11, app. tables 3.1–3.14). Around 21 million acres, or 15 percent of the area in other private ownership, has been converted to other uses or transferred to other owners since 1952. Most of this area reduction has occurred on farmer ownerships.

Farmer ownership of timberland has declined for several reasons. Many owners of timberland who were farm operators sold or passed on their land holdings to new owners who did not secure their primary source of income from farming. In addition, many farmers increasingly secured their livelihood off farms and were subsequently classified as "other individual" private owners, i.e., all owners of privately held timberland except forest industries, farmers, and corporations. Conversion to other uses has also reduced farm forest area.

The timberland area in farmer ownership is projected to decline 13 million acres by 2030. The projected addition of approximately 3 million acres of planted pine under the Conservation Reserve Program, particularly in Georgia, Mississippi, Alabama, and South Carolina, is not nearly enough to stem or reverse the overall projected decline in farm forest area. The projected reductions result in part from the continuing overall drop in the number of farms, caused by an economic shakedown in the farm economy. This trend is consistent across the South and in line with historical trends.

Other individual and corporate private owners have acquired many of the timberland acres once owned by farmers. Corporate owners include insurance companies, banks, and other institutional owners; but to be classified as such, they cannot own facilities that process timber.

Data that allow separate identification of corporate and other individual ownerships are available since 1977 only. Corporate private owners now hold 16 million acres of timberland in the South and have added approximately 2 million acres of this total since 1977. This acquisition was spread across all five forest management types—pine plantations, natural pine, mixed pine–hardwoods, upland hardwoods, and bottomland hardwoods—but the largest increases (28 percent) were in pine plantations and upland hardwoods.

Corporate ownership is projected to increase in size by approximately 6 million acres, or by 38 percent of its current size. Part of the land is expected to be acquired through investment in southern pine timberland. As a result, pine plantation area in corporate ownership will more than triple by 2030.

It is uncertain how these corporate lands will be managed in the future. It remains to be seen whether some corporate owners will divest themselves of timberland after harvesting the current rotation's crop, or if they will invest in practices in line with longrun management of these timberlands. In this study, it has been assumed that these lands will be managed more intensively than land in other private ownerships.

Individual owners, the remaining component of the other private ownership group, are the largest ownership class. This diverse set of owners holds over one-third of the southern timberland base, equal to 66 million acres—four times as much as corporate owners.

Unlike the corporate class, individuals in the other private owner group are projected to reduce their holdings of timberland in the future. The projected reduction is approximately 4 million acres, or 6 percent of the area in this ownership, by 2030.

Forest industry has steadily acquired timberland in the South since 1952. In 1985, industry owned or had under long-term lease 42 million acres of timberland in the South, 9 million acres more than in 1952. Most of industry's acquired acres have been in the South Central region, but the trend is upward across all the Southern States.

Timberland acreage in the forest industry category in this study includes land under long-term lease from other private owners. Leased acreage is included with industry's acreage because leased lands are generally managed similarly (e.g., intensive forest management practices are applied).

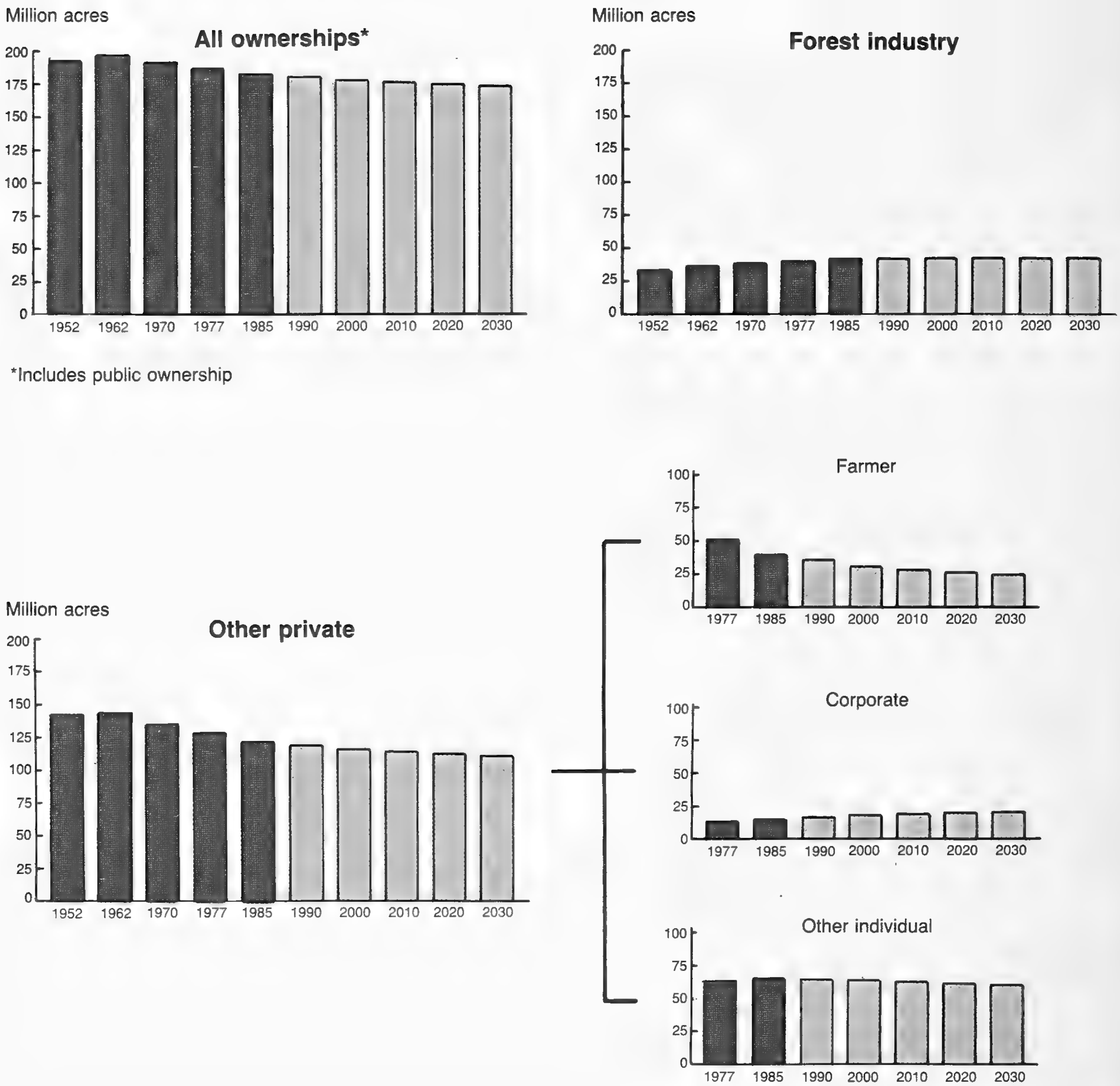
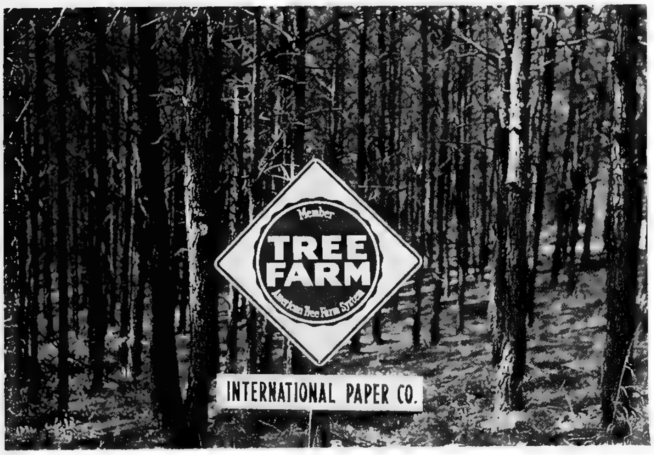


Figure 3.11—Timberland area in the South by forest ownership, 1952–85, with projections to 2030



The forest industries have been increasing their ownership of timberland for decades. They now own or have under long-term lease 42 million acres, nearly a quarter of all the timberland in the South.

The area under long-term lease was close to 4 million acres in 1985. Most of the leased land is in pine (58 percent), with smaller amounts in oak–pine (11 percent) and hardwoods (31 percent).

In the past, many forest products companies have found it advantageous to own large amounts of timberland. Some of the recognized advantages include an assured wood supply for mills that represent very large investments, augmentation of supplies of low-cost timber, an inflationary hedge, and certain tax advantages (O'Laughlin and Ellefson 1982, Clephane 1978). In addition, banks sometimes require that such companies own certain levels of timberland to qualify for loans.

Although the latest survey data do not show a significant slackening in the acquisition of timberland by industry, several factors now seem to be operating that reduce the attractiveness of industrial ownership of timberland. These include cash-flow considerations, other investment opportunities in a company's portfolio, opportunities for land leasing and long-term harvesting rights, and the increased substitution of more-intensive forestry practices in place of land acquisition.

Given this current setting, it has been assumed that the area in forest industry ownership will increase at a slower rate than in the past. Forest industries are projected to add around 1 million acres over the next 45 years, including both fee simple purchases and lands under long-term lease. This represents a 3-percent increase. Most of the acquired land is expected to be in the South Central region.

Public ownership of timberland in the South represents only about 10 percent of the total timberland base. Public ownership of timberland is projected to increase slightly, by 0.6 million acres or 3 percent, by 2030. Most of the increase is on other public ownerships (e.g., State lands), rather than national forests.

Projected Changes by Forest Management Type— Changes in the area of the major forest management types have large impacts on softwood and hardwood net annual growth and inventories. They also reflect the effects of management practices and differences in practices among States and ownerships.

The largest change in the area of forest management types since 1952 has been the 31-million-acre decline in the area of natural pine (table 3.10, fig. 3.12). Much of the pine in the South in 1952 seeded naturally on the fields and pastures that were idled as a result of the agricultural depressions of the 1920's and 1930's and the economic and social forces associated with World War II. In the absence of management activities, the natural forest succession in these stands is to mixed pine–hardwoods or hardwoods. Most of the other private timberland owners have been accepting whatever nature provides in the way of replacement species after harvest. Large areas of what had been pine stands on these ownerships have come back following cutting to mixed pine–hardwoods or hardwood stands. Large areas of natural pine have also been converted to cropland, home sites, roads, and other uses.

As indicated in the tabulation below, part of the natural pine area is planted to pine after harvest. This, along with the conversion of mixed pine–hardwood and upland hardwood stands to planted pine, is reflected in the rapid increases in the area of pine plantations, from 1.8 million acres in 1952 to 20.9 million in 1985. Forest industry accounted for most of this planting, including the introduction over time of increasing amounts of genetically improved stock.

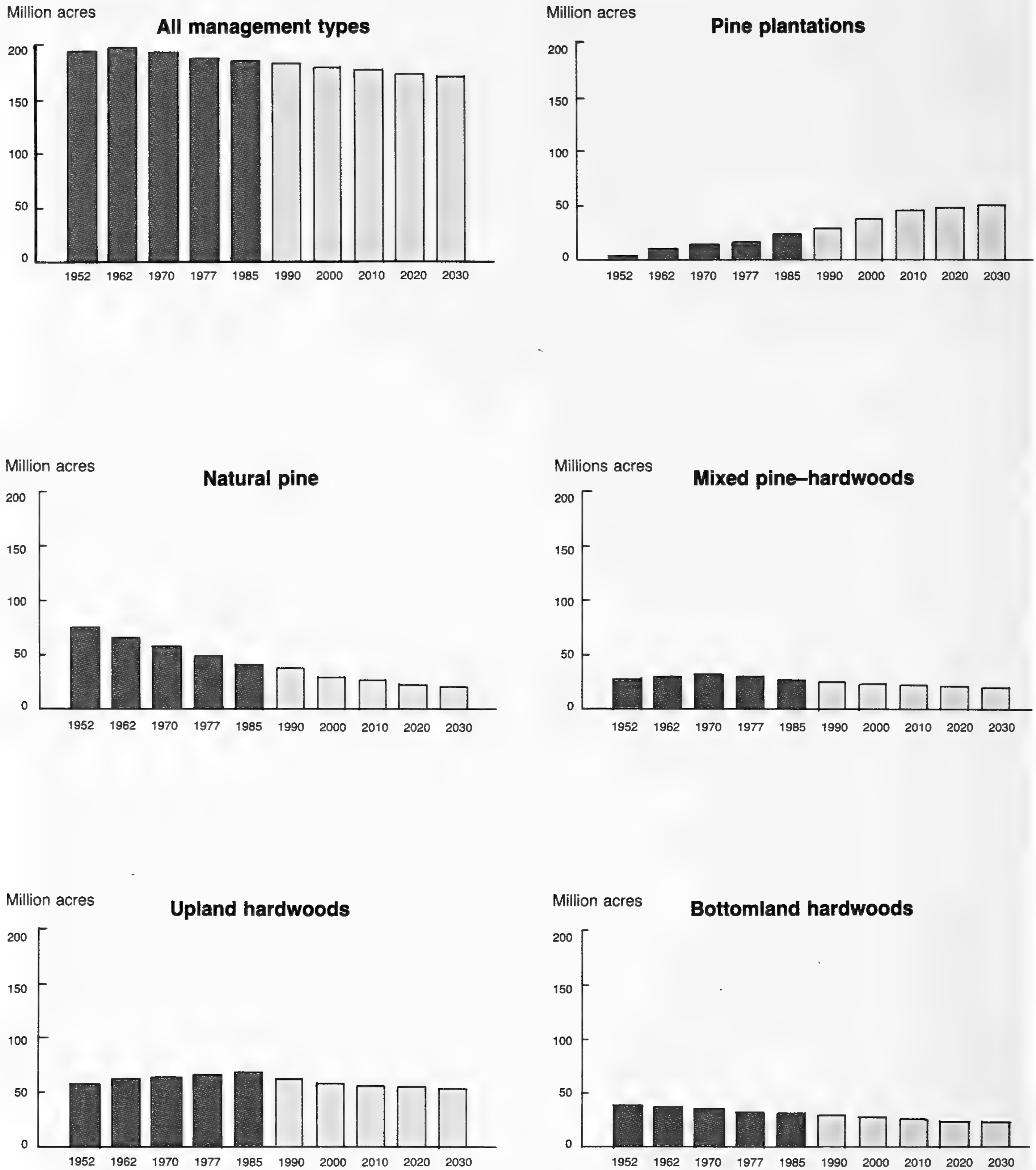


Figure 3.12—Timberland area in the South by forest management type, 1952–85, with projections to 2030

Reforestation activities after clear-cut harvest of natural pine stands on other private timberlands in the South, 1971–81 (based on information from Fecso and others 1982)

Reforestation activity	*Percent of total acres clearcut*
Planted pine	36
Seeded pine	1
Left seed trees	9
No active reforestation	54

Part of the land going out of crop and pasture use in the 1950's and early 1960's came back naturally to mixed pine–hardwoods and hardwoods. Conversely, part of the decline in the area of mixed pine–hardwood since 1970 reflects conversion to cropland and pasture. Part of it also reflects conversion, mostly after harvest of mixed pine–hardwood stands, to pine plantations.

The area of bottomland hardwoods dropped rapidly in the 1960's, largely because of clearing the land for soybeans. Since 1970, the acreage in this type has continued a slow decline. The reduction in bottomland hardwoods has been concentrated in those States in the Mississippi River basin having large areas of bottomlands.

The changes in the other management types described above have taken place all across the South. Changes in each State generally resemble the Southwide changes.

The distribution of timberland by management type is not uniform across the South. In general, pine and mixed pine–hardwood types make up the highest proportion of timberland in the Coastal Plain, Piedmont, and Ouachita Mountains (figs. 3.13 and 3.14). Hardwood types are most common in coastal lowland areas, the Mississippi River Delta, the central upland regions, and the southern Appalachian Mountains (figs. 3.15 and 3.16).

The projected changes in the area of the forest management types are consistent with recent historical trends. The largest area changes are projected for the pine types. The area in pine plantations is projected to go up by approximately 27 million acres, more than doubling by 2030. In contrast, natural pine area is projected to drop by 18 million acres, or nearly half. The net change in southern pine area is an increase of approximately 9 million acres by 2030.

The projected doubling of planted pine area is largely due to the addition of pine plantations on forest industry lands.

Table 3.14—Area of timberland with evidence of artificial regeneration in the South, by State and forest management type[1]

Thousand acres

State	Forest management type: Oak–pine	Hardwood	Total
Southeast			
Florida	136	57	193
Georgia	165	106	271
North Carolina	82	36	118
South Carolina	126	37	163
Virginia	228	112	340
Total	737	348	1,085
South Central			
Alabama	447	218	665
Araknsas	307	194	501
Louisiana	237	280	517
Mississippi	393	306	699
Oklahoma	173	80	253
Tennessee	52	78	130
Texas	344	270	614
Total	1,953	1,426	3,379
Total South	2,690	1,774	4,464

[1] Based on the most recent surveys on forest resources in each State.

With management intensification on these industrial lands, many harvested natural pine stands are being artificially regenerated. This conversion to planted pine allows genetically improved stock to be introduced on many acres and trees to be spaced in a manner that reduces the cost of subsequent industrial operations. Some of this increase in pine plantation area will result from the transition of young stands currently classified as oak–pine and hardwood types, but which have evidence of artificial regeneration, to the planted pine type (table 3.14).

The projected drop in natural pine area is also due to an assumed continuation of trends in substantial hardwood encroachment after harvest of pine stands on the lands in other private ownerships. The other private ownerships contain the bulk of the natural pine area, and the projections assume that current trends in reforestation (Fecso and others 1982, Royer 1985) will largely continue, i.e., these owners often do not invest in reforestation. Royer suggested that the reforestation decisions of such owners are governed largely by public programs of financial and technical assistance.

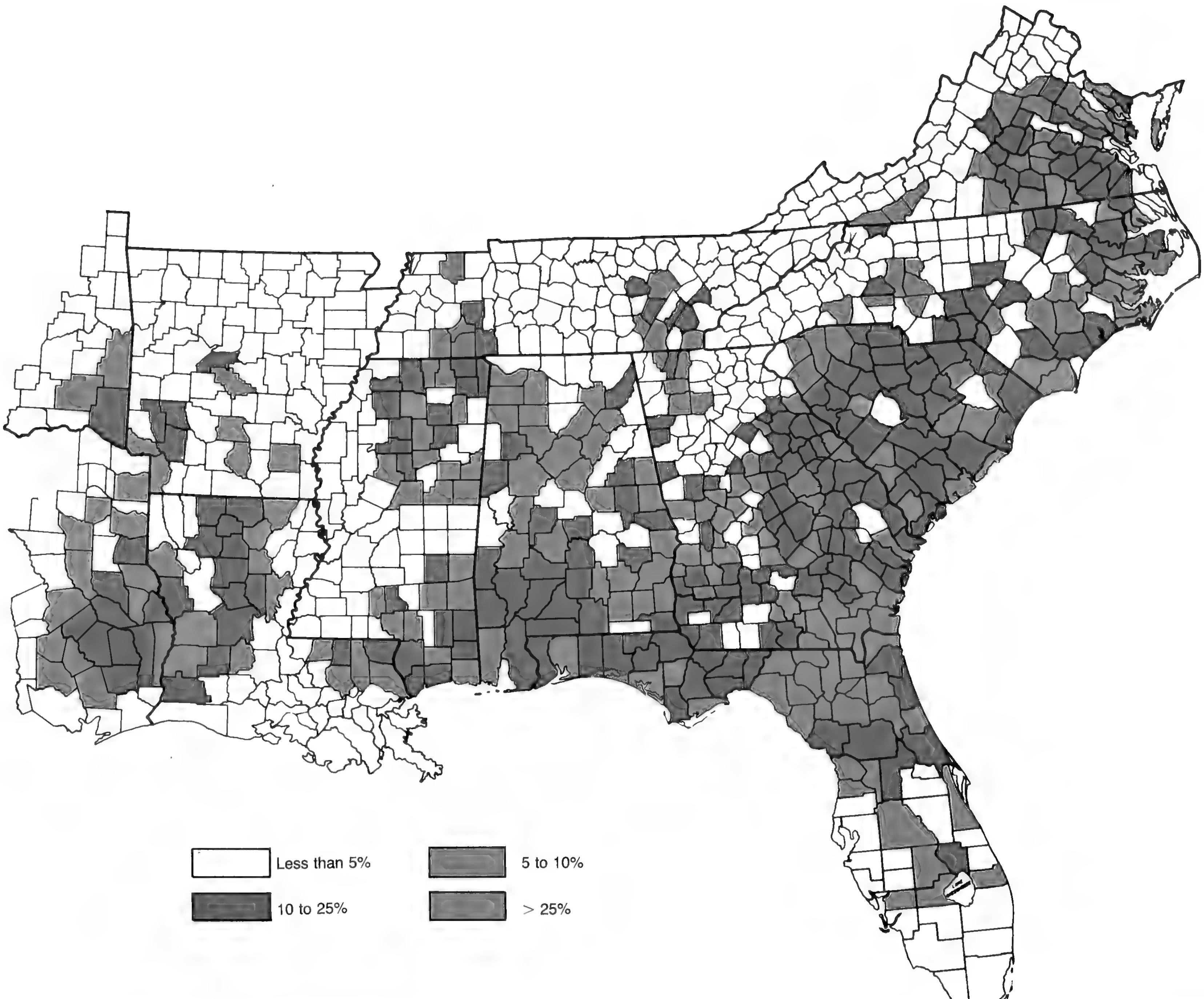


Figure 3.13—Proportion of timberland in pine plantation management type

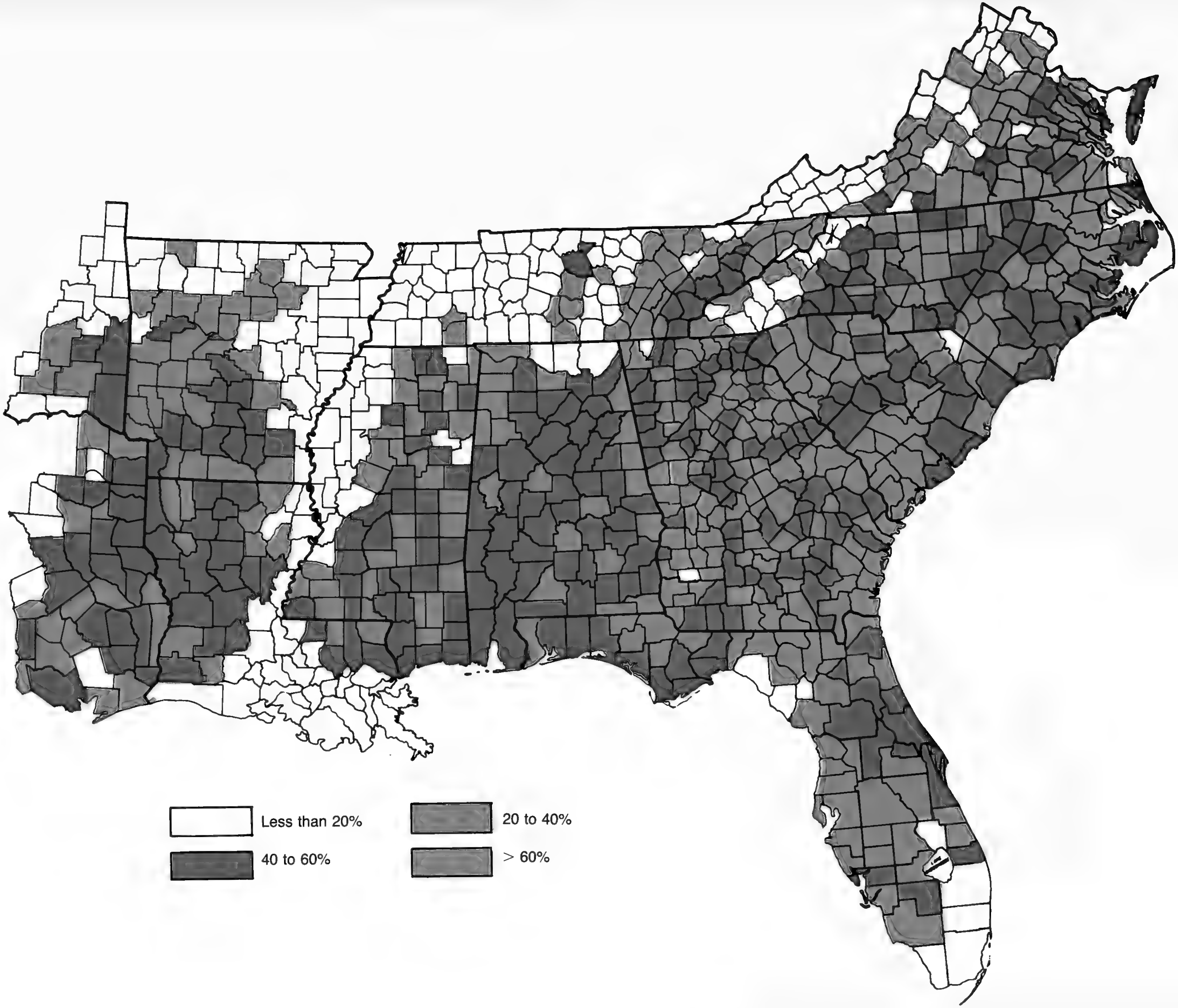


Figure 3.14—Proportion of timberland in natural pine and mixed pine-hardwood management types

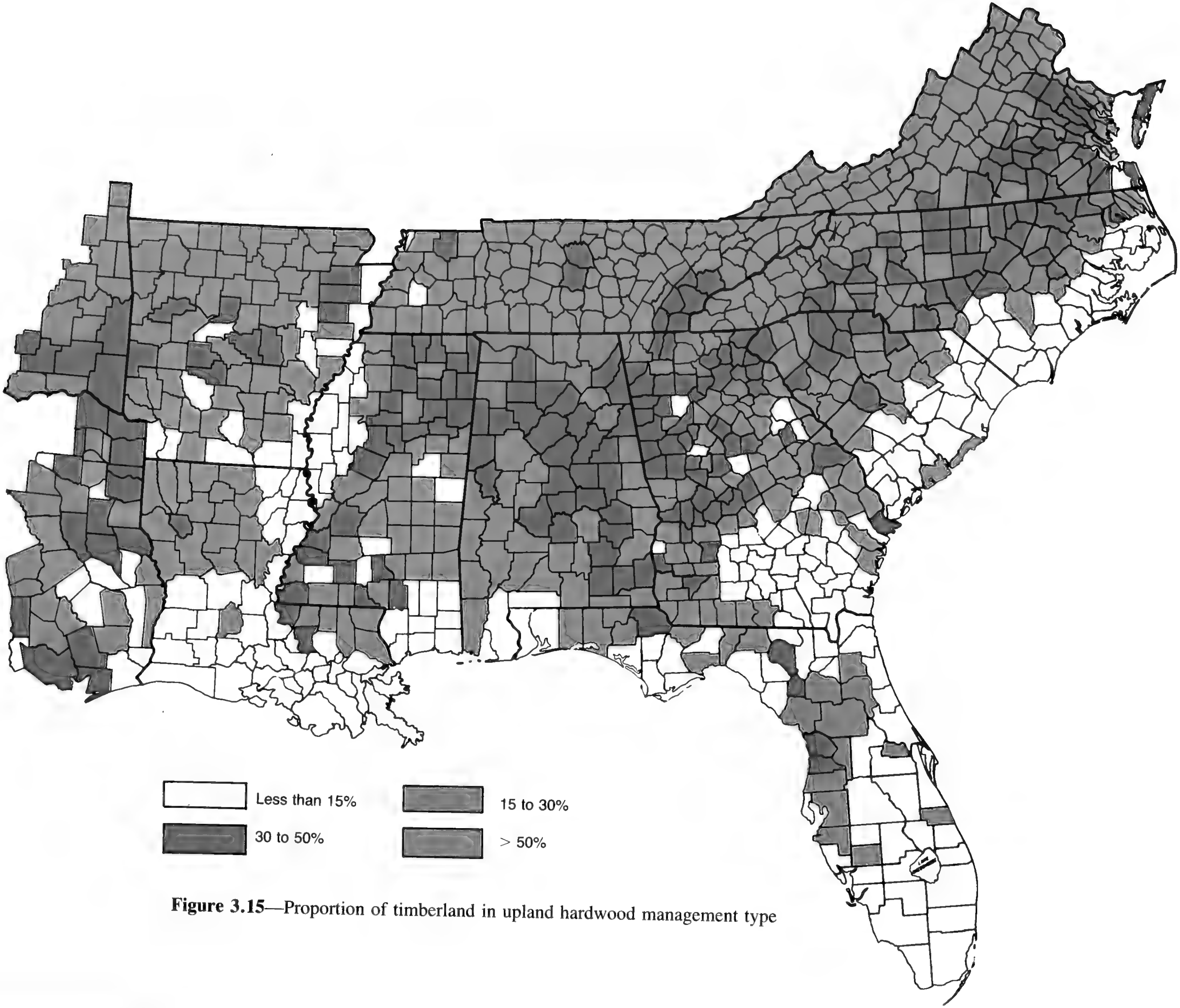


Figure 3.15—Proportion of timberland in upland hardwood management type

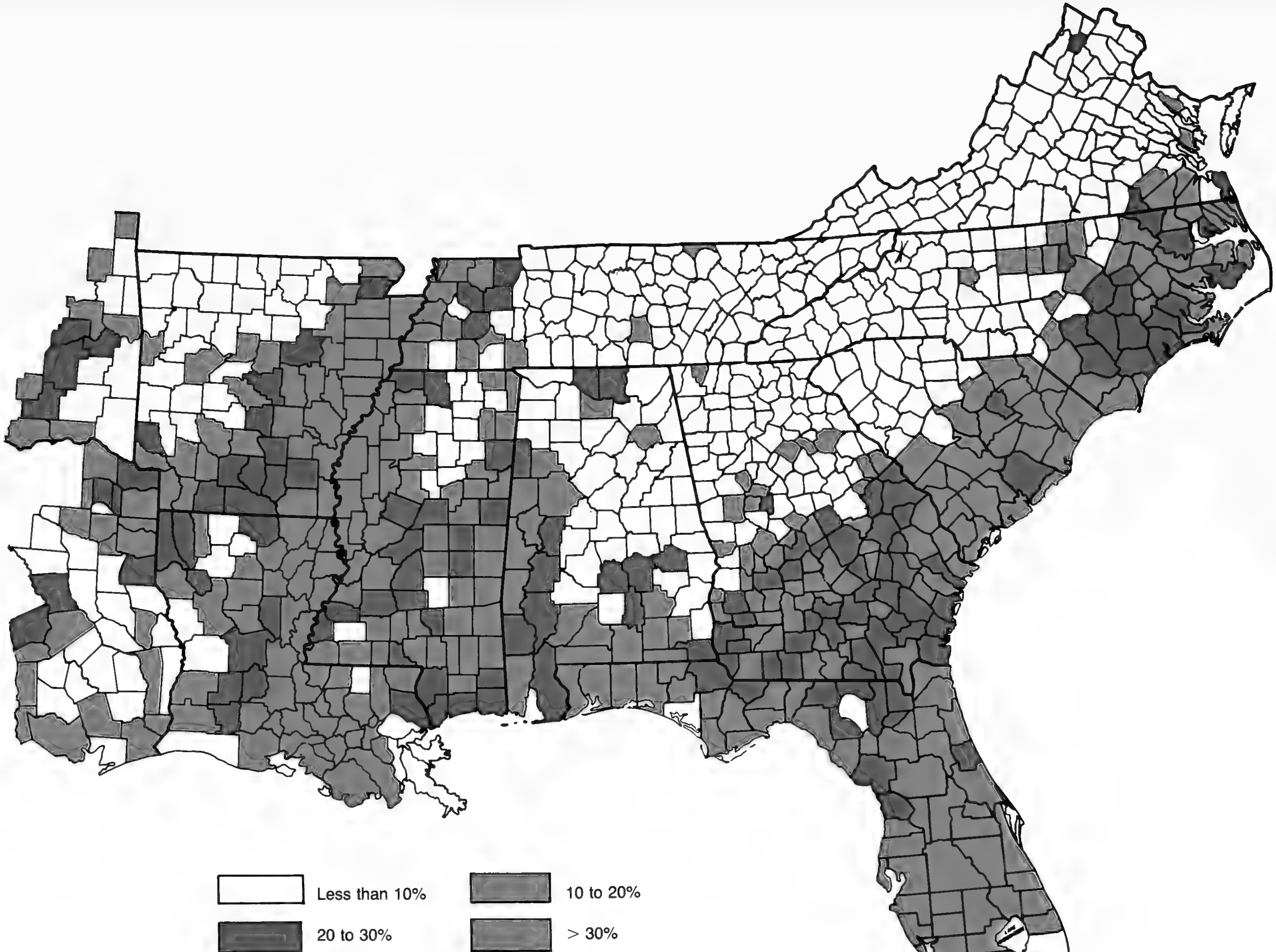


Figure 3.16—Proportion of timberland in bottomland hardwood management type

Some of the projected increase in plantation pine area is from the planting of pine after mixed pine–hardwood stands are harvested. The area in mixed pine–hardwood is projected to drop by 6 million acres, or 22 percent, over the projection period. Much of this reduction occurs on forest industry lands.

The total hardwood area in the South is projected to decrease by approximately 12 million acres, or 13 percent, by 2030. Much of this reduction is in the upland hardwood type, which currently occupies over one-third of the southern timberland base.

The projected drop in upland hardwood area results from several factors. First, some of the upland hardwood area is expected to be converted to planted pine, especially on industry lands. Second, some of the timberland on farms that is converted to cropland is currently in upland hardwoods. The last major reason is conversion of upland hardwood acreage to other land uses such as urban and built-up uses.

Bottomland hardwood area is also projected to decrease, by 4 million acres. However, the rate of clearing of bottomland hardwood forest for cropland is expected to slow down. Some bottomland hardwood area is projected to be withdrawn from the timberland base in States such as Louisiana for management by State agencies to protect wildlife habitat and other nonmarket resources.

The projected changes by State are in general consistent with the Southwide changes.

Projected Changes by Site Class—Site, a measure of the inherent capacity of land to grow trees, is one of the important determinants of changes in the timber resource. However, analysis of data first assembled around the mid-1960's indicates there have been no major net changes in the regional distribution of timberland by site class. The last two surveys in the Southeast indicate that overall there have been only relatively minor shifts in the site-class distributions toward the higher classes.

Net changes in the distribution of site classes by forest type have also been relatively small except for the bottomland hardwood class. A large drop in the bottomland hardwood area in the upper site-class was due largely to the conversion of such high-quality timberland to cropland, including many acres of soybeans in bottomlands.

Based on the analysis of historical site data, it was assumed in this study that the distribution of timberland among the site classes would not change significantly over the projection period. However, the conversion of many forest acres to pine plantations implies a shift toward higher site land. This reflects the upgrading of substantial acreages of low-productivity land in the Coastal Plain that are being drained, site prepared, bedded, and planted to pine.

Assumptions on Timber Yields

The above projections of area change provide part of the data needed for projecting changes in net annual timber growth and inventories.

Since volume and growth estimates are derived from acreage movements through assumed yield tables, assumptions on timber yields are also crucial in using the Timber Resource Inventory Model to project timber resource changes. Empirical yields developed for major forest types in the Southeast from forest survey data provided measures of the proven performance of fully stocked stands in the region (McClure and Knight 1984). Assumptions on yields were derived from data collected on some 24,775 forest survey plots established randomly throughout the Southeast. These data were screened to identify those plots in fully stocked stands based on forest survey standards. The plots in fully stocked stands were further divided into three broad site classes within each of the five broad management types. Average volumes per acre were calculated for the fully stocked stands by 5-year age classes.

Compilation of the average volumes per acre by 5-year age classes was possible in the Southeast because forest survey crews there record the actual age of each timber stand sampled. Even-aged stands are assumed, and no mixed-aged classifications are permitted. In the compilations, the age class represents the midpoint of the class. For example, the 15-year age class includes stands 13 to 17 years old.

In the South Central region, forest survey crews record 10-year age classes and recognize mixed-aged stands. The empirical yields developed by 5-year age classes in the Southeast were used to help refine the broader age classes in the South Central region and enabled the development of consistent basic resource units for the Timber Resource Inventory Model input for the entire region. Forest survey data in the South Central region generally supported the empirical yields developed in the Southeast, with the exception of yields in the upland hardwood management type. Yields for this type were reduced by 15 percent for the South Central region.

These empirical yields were subjected to widespread technical review by representatives of the States, forest

industries, and universities. There were several meetings of technical review groups in which the assumptions on timber yields were discussed at length. Numerous revisions in the assumptions on timber yields were discussed in an attempt to reach a consensus among the technical experts. Much of the discussion centered around the assumptions on timber yields for pine plantations because of their importance in the region. Finally, fairly broad agreement was reached on the assumptions on timber yields with some acknowledged exceptions. Generally, the empirical yields developed from forest survey in the Southeast were used, with some minor revisions, for the natural stands and the pine plantations on farmer and other individual private lands. New, higher yields were developed and used for pine plantations on industry, other corporate, and public ownerships. It was assumed that more-intensive site preparation and management on these ownerships would result in higher yields.

A 10-percent increase over the base yields was assumed for pine plantations established with genetically improved stock regardless of ownership. A 15-percent increase over the base yields was assumed for the highest management intensity on forest industry and corporate ownerships. For management intensities where thinning is practiced, no overall increase in cubic-foot yields was assumed. The volume removed during thinning was subtracted from the volume at final harvest. The same technical groups responsible for development of assumptions on timber yields guided the assumptions on enrollment rates into the higher management intensities, by ownership.

The highest timber yields (growth) are achieved in pine plantations, particularly those planted with genetically improved stock and intensively managed.

Assumptions on timber yields also involve the relationship between the initial timber inventories, as compiled into basic resource units, and the assumed timber yields. The assumed timber yields developed and adopted for this assessment of southern timber supplies were intended to reflect the prospective yields of fully stocked stands, based on forest survey stocking standards. The initial timber inventories comprise stands that span the full range of stocking conditions. In this study, the compilation of initial timber inventories into basic resource units recognized the following stocking levels, based on forest survey standards: (1) fully stocked (100 percent or more), (2) medium stocked (60–99 percent), and (3) poorly stocked (less than 60 percent). These stocking percents refer to growing stock trees only; the stocking of rough and rotten trees was ignored.

Ideally, the average volumes per acre for fully stocked stands should coincide with the base timber yields assumed for that particular management type and site, but some differences were accepted. Reasons for the differences include (1) the wide range of stocking among the stands considered fully stocked; (2) stocking of older, residual trees in a given age class; (3) stocking of younger trees that have filled in holes within a given age class; and (4) variations in the species mix within a management type.

As part of the Timber Resource Inventory Model input, average stocking level midpoints were developed to quantify the relationship between the average volumes per acre in the initial inventories and the assumed timber yields. In the projection process, two fundamental options are available affecting the application of the assumed timber yields: (1) the yield table option, and (2) the approach-to-normality option. In the yield table option, volume per acre for a given age class is the product of the assumed yield for that age class times a constant stocking level midpoint for that management intensity and stocking level. In the approach-to-normality option, stocking level midpoints approach 1.0 over time. An equation is used to quantify the rate of approach.

In the early stages of this study, both options were tested. Based on the results of these tests, the approach-to-normality option was selected with full approach in the younger age classes and one-half the full approach in the older ages. Selection of this option assumes that the stocking in understocked stands will gradually improve over time.

Appendix tables 3.15–3.20 summarize the base timber yields used in the Timber Resource Inventory Model in the projections of prospective timber supplies in the South. These assumed yields are for the minimum management

intensity (level 1). In these tables, high sites include those acres capable of growing 85 or more cubic feet of wood per acre per year, based on fully stocked, natural stands. Medium sites are capable of growing 50 to 84 cubic feet per year; poor sites, 20 to 49 cubic feet.

Other Assumptions

Other key assumptions affecting the projection results include (1) enrollment rates into the higher management intensities, (2) minimum harvest ages and the allocation of harvest among age classes, and (3) the amount and timing of thinnings. Although recent Forest Survey findings provided some useful information in the development of these assumptions, they were primarily based upon the consensus of technical review groups composed of members from State forestry agencies, forest industries, forestry schools, and other consultants. As one would expect, expert opinions on these assumptions varied considerably, and limitations within the projection models restricted the range of options. For example, the Timber Resource Inventory Model will accommodate a maximum of five management intensities.

Enrollment Rates—For pine plantations, up to five levels of management intensity were recognized: (1) regular planting stock without thinning, (2) regular planting stock with thinning, (3) genetically improved planting stock without thinning, (4) genetically improved planting stock with thinning, and (5) genetically improved planting stock without thinning but with the most intensive site-preparation and management practices.

Although the proportions varied by ownership, approximately 15 percent of the pine plantations already established as of the dates of the base data were assumed to have been established with genetically improved planting stock and were entered in management intensities 3 and 4. Initially, no acres were placed in management intensity 5. Rates of commercial thinning determined from the most recent forest surveys were used to estimate the number of acres in management intensities 2 and 4.

In the first 5-year projection period, 1980–85, 70 to 75 percent of all new pine plantations were assumed to be planted with genetically improved stock. These percents were increased until 1995, at which time it was assumed all new pine plantations would be established with genetically improved stock. In the first projection period, 20 percent of the new pine plantations established on forest industry land were enrolled in management intensity 5. This percent was increased each period until 1995. Beyond 1995, 50 percent of all new pine plantations established on industry land were enrolled in management intensity 5. Slightly lower levels of management intensity were assumed on the other corporate land. On the farmer and other individual private ownerships, only 5 percent of the plantation acreage was enrolled in management intensity 5.

Except for natural pine stands on medium and high sites, only one level of management intensity was assumed for natural stands. For natural pine stands on medium and high sites, a second management intensity with thinning was assumed. Rates of commercial thinning, by ownership class, were developed from the most recent forest survey data available.

Allocation of Harvest—The Timber Resource Inventory Model offers the user several controls over the allocation of harvest. One of these controls is the specification of a minimum harvest age for each grouped resource unit (owner-type-site combination). Volume on acres supporting timber stands younger than this minimum harvest age cannot contribute to meeting the timber demands through final harvest. Another control is the selection between two harvest options: (1) harvest oldest stands first, or (2) specify the percent of the harvest to come out of each eligible age class. In the latter option, if a particular age class is exhausted before the demand is satisfied, the remainder of the harvest from that resource unit is removed on the oldest-first basis.

Thinning is a widely used management practice. It is designed to increase the value of the timber at final harvest and does not significantly change yields in terms of volume of timber growth.

In the base projections, the oldest-first option was assumed with the following protection against liquidating all of the old stands on public, forest industry, and corporate ownerships: On these ownerships, the minimum harvest age for both upland and bottomland hardwood stands on poor sites was set at 90 years. On the farmer and other individual private ownerships, the minimum harvest age for both upland and bottomland hardwood stands on poor sites was set at 50 years.

On forest industry and corporate ownerships, the minimum harvest age for pine and mixed pine–hardwood stands was set at 20 years. On these ownerships, the minimum harvest ages for hardwoods were 35 years for high sites and 40 years for medium sites. On the farmer and other individual ownerships, the minimum harvest age for pine stands was also set at 20 years but ranged from 35 to 50 years for mixed pine–hardwood and hardwood stands. On public lands, minimum harvest ages ranged from 35 to 55 years for pine and mixed pine–hardwood stands. The minimum harvest age for hardwood stands on high and medium sites on public land was set at 60 years.

In the South Central region, the minimum harvest age was increased by 5 years for all ownerships and management types. This decision was based on an assumption of slightly longer rotations, on the average, and more emphasis on sawtimber rather than pulpwood production.

Thinnings—In those management intensities with commercial thinnings, it was assumed that one-third of the inventory would be removed in one thinning. It was also assumed there would be no overall increase or decrease in total yield as the result of thinning. The amount removed during thinning was subtracted as a constant reduction at subsequent ages in the yield tables. In those management intensities calling for thinning of pine plantations, thinning was assumed at age 20 on all private lands if the stands had not been harvested; on public lands the thinning age was set at 30 years for pine plantations.

Thinnings of natural pine stands on private lands were assumed at age 25 on high sites and at age 30 on medium sites. Time of thinning in natural pine stands on public land ranged from 30 to 40 years of age.

There are, of course, other assumptions underlying the projected changes in timber resources presented below. The most important of these are described in the appropriate places in the following text.

Timber supplies—the volume of timber harvested or available for harvest in the future—are one of the important measures of resource change. Timber supplies are all roundwood products, regardless of source. They include industrial roundwood products such as sawlogs, veneer logs, pulpwood, other industrial roundwood products, and fuelwood. Although most timber supplies come from growing stock, substantial quantities come from other sources: (1) trees smaller than 5.0 inches d.b.h.; (2) the stumps, tops, and limbs of growing-stock trees; (3) rough and rotten trees; (4) dead trees; and (5) trees that grow on land other than timberland.

Southwide Trends

Between 1952 and 1962, annual softwood supplies (harvests) from the South declined from 3.1 billion to 2.8 billion cubic feet, or by 7 percent (table 3.15, fig. 3.17). A 30-percent decrease in softwood sawlog production more than offset a 35-percent increase in the annual production of softwood pulpwood. Hundreds of small portable sawmills and many larger stationary mills closed down in this period as the region experienced a major shift from lumber to pulp and paper production.

Between 1962 and 1984, annual softwood supplies climbed to 5.0 billion cubic feet, an increase of 77 percent. This increase is attributed to further expansion in the pulp and paper industry, a revitalized lumber industry, and the establishment and development of the pine plywood industry.

Over the past 30 years, other private timberland has been the primary source of softwood timber supplies in the South; however, the proportion coming from this source has been declining (fig. 3.17). In 1952, these other private timberlands provided about 71 percent of the softwood supplies. This proportion has decreased to 58 percent. In 1952, 23 percent of harvested softwood timber came from forest industry lands; these lands now provide about 35 percent. Over this period, public timberlands have provided about 7 percent of the softwood supplies.

In the base projections, softwood timber supplies (harvests) will rise to 5.8 billion cubic feet of roundwood by 2000. This represents a 15-percent increase over current levels. Forest industry timberland is expected to provide most of this increase as softwood supplies from other private timberland begin to level off. Between now and 2000, annual softwood supplies from forest industry land are projected to increase by 28 percent, from 1.8 billion to 2.3 billion cubic feet.

Table 3.15—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in the South, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Ownership and item	Year 1952	1962	1970	1976	1984	Projections[3] 1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	109	129	152	172	192	296	318	337	376	402
Timber removals[2]	123	132	164	183	203	310	331	347	384	409
Net annual growth	251	324	363	351	308	307	290	296	330	350
Inventory[4]	4,975	6,866	7,336	8,343	8,365	8,842	9,572	9,670	9,474	9,162
Other public										
Roundwood supplies[1]	81	73	101	139	149	183	189	193	198	203
Timber removals[2]	85	78	107	149	161	194	197	200	204	208
Net annual growth	126	160	201	212	226	191	187	201	209	207
Inventory[4]	2,223	2,748	3,306	3,982	4,723	4,628	4,895	5,029	5,198	5,333
Forest industry[5]										
Roundwood supplies[1]	711	685	1,185	1,557	1,778	1,930	2,276	2,617	2,979	3,034
Timber removals[2]	741	703	1,245	1,635	1,888	2,029	2,375	2,706	3,056	3,095
Net annual growth	992	1,294	1,481	1,664	1,863	2,222	2,749	3,162	3,342	3,450
Inventory[4]	17,092	22,363	23,439	25,137	26,128	24,142	25,078	28,807	32,611	35,476
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	1,005	1,007	963	864	764	738	695
Timber removals[2]	([6])	([6])	([6])	1,064	1,074	1,028	903	790	757	709
Net annual growth	([6])	([6])	([6])	1,423	1,023	650	686	738	774	770
Inventory[4]	([6])	([6])	([6])	22,831	18,833	18,907	14,531	12,437	11,845	12,002
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	298	324	452	513	618	699	720
Timber removals[2]	([6])	([6])	([6])	316	345	478	537	641	718	736
Net annual growth	([6])	([6])	([6])	445	448	456	622	734	779	828
Inventory[4]	([6])	([6])	([6])	7,161	8,832	8,264	8,575	9,704	10,672	11,481
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	1,299	1,600	1,571	1,661	1,616	1,577	1,535
Timber removals[2]	([6])	([6])	([6])	1,370	1,692	1,652	1,731	1,671	1,618	1,566
Net annual growth	([6])	([6])	([6])	1,968	1,851	1,431	1,555	1,668	1,670	1,649
Inventory[4]	([6])	([6])	([6])	30,487	34,954	31,934	28,860	27,164	27,045	27,482
Total other private										
Roundwood supplies[1]	2,171	1,959	2,086	2,594	2,931	2,997	3,039	2,999	3,014	2,950
Timber removals[2]	2,284	2,017	2,170	2,750	3,111	3,158	3,172	3,102	3,093	3,010
Net annual growth	2,298	2,903	3,541	3,836	3,322	2,537	2,864	3,142	3,224	3,247
Inventory[4]	33,957	40,910	52,216	60,519	62,619	59,105	51,967	49,306	49,563	50,965

Table 3.15—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in the South, by ownership, selected years 1952–84, with projections[3] to 2030—Continued

Million cubic feet

	Year					Projections[3]				
Ownership and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
All ownerships										
Roundwood supplies[1]	3,072	2,846	3,524	4,462	5,049	5,405	5,821	6,146	6,567	6,589
Timber removals[2]	3,233	2,930	3,686	4,717	5,362	5,691	6,074	6,356	6,737	6,721
Net annual growth	3,667	4,681	5,586	6,063	5,720	5,257	6,090	6,801	7,104	7,254
Inventory[4]	58,247	72,907	86,297	97,981	101,836	96,717	91,512	92,812	96,847	100,935

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed incultural operations such as noncommercial thinning and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under longterm lease from other private owners.6 Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Between 1962 and 1984, softwood timber harvest (supplies) increased from 2.8 billion to 5.0 billion cubic feet, a rise of 75 percent. The additional harvests were used to supply the expansion of the pulp and paper products industry, a revitalized lumber industry, and the establishment and expansion of the pine plywood industry.

Softwood supplies from other private land are projected to increase less than 4 percent by 2000. Roundwood supplies from farmer ownerships decline by 14 percent. Little change is projected in the supplies from other individual owners, while supplies from other corporate holdings increase 58 percent. These projections suggest that forest industry lands will provide almost 40 percent of the softwood supplies from the South by 2000, compared to about 35 percent currently. Appendix tables 3.21–3.34 show historic trends and State allocations of the projections of softwood supplies by ownership.

Historically, natural pine and mixed pine–hardwood stands have been the primary sources of softwood timber supplies in the South; but here again, the proportion coming from these sources has been declining (table 3.16). In 1952, these types provided about 95 percent of the softwood supplies. This proportion has decreased to about 77 percent as more and more of the softwood comes from pine plantations. Pine plantations now provide 14 percent of the softwood. Less than 10 percent comes from hardwood types, and a significant portion of this is cypress from the bottomland hardwood stands (fig. 3.18).

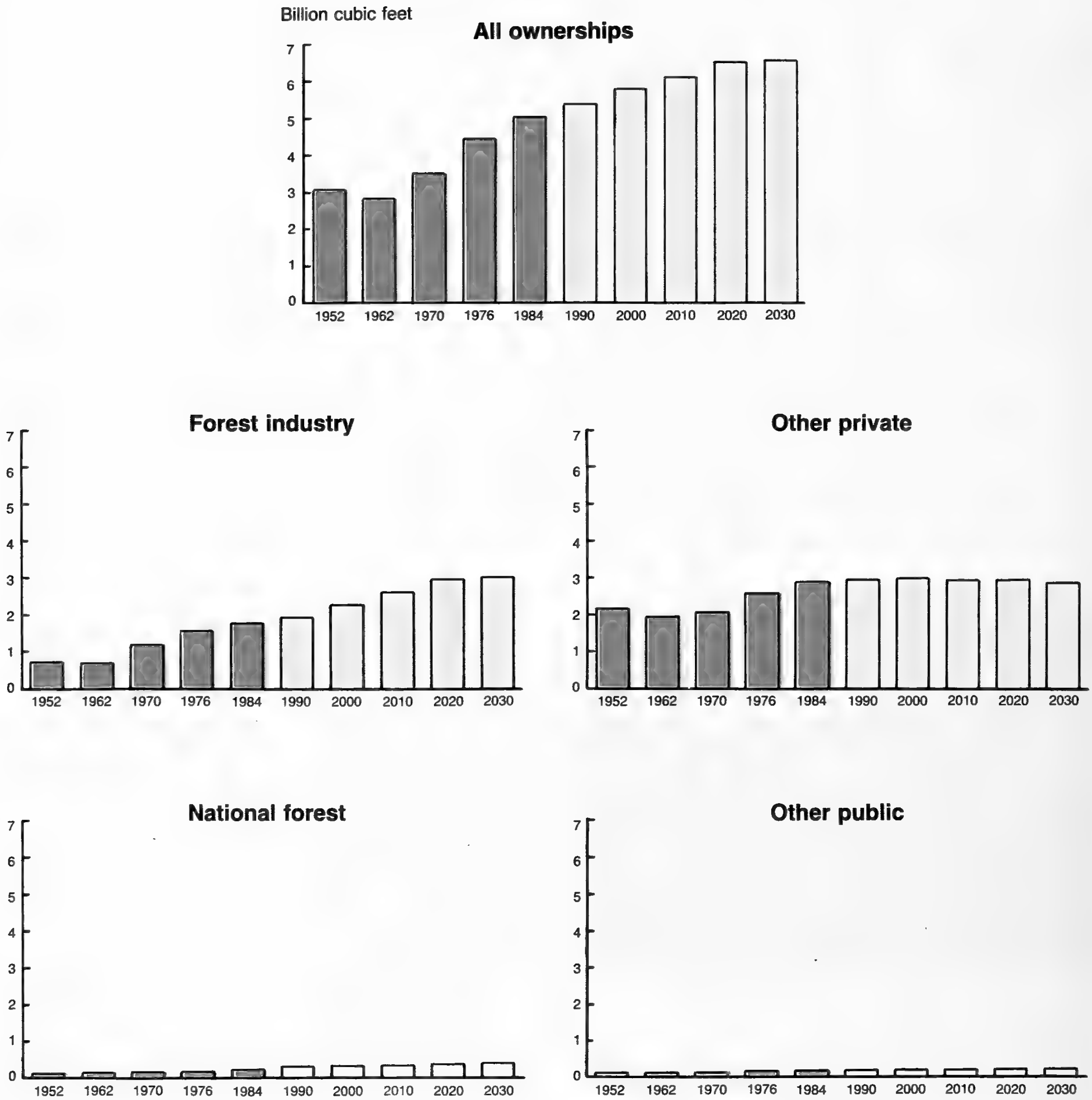


Figure 3.17—Softwood roundwood supplies in the South by forest ownership, 1952–84, with projections to 2030

Table 3.16—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in the South, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	13	115	505	684	1,322	2,479	3,539	4,141	4,288
Timber removals[2]	—	13	120	542	719	1,398	2,592	3,664	4,250	4,374
Net annual growth	76	365	668	1,030	1,308	2,309	3,720	4,429	4,802	5,023
Inventory[4]	658	3,736	7,027	9,822	13,567	17,249	28,691	40,309	47,592	53,620
Natural pine										
Roundwood supplies[1]	2,650	2,367	2,851	3,065	3,141	3,048	2,150	1,623	1,468	1,340
Timber removals[2]	2,758	2,446	2,987	3,248	3,373	3,205	2,243	1,678	1,505	1,366
Net annual growth	2,821	3,197	3,514	3,537	2,974	1,961	1,581	1,447	1,357	1,321
Inventory[4]	44,119	49,596	53,768	58,210	58,397	45,184	30,980	24,337	21,794	20,315
Mixed pine–hardwoods										
Roundwood supplies[1]	256	289	336	592	742	733	842	552	484	497
Timber removals[2]	293	291	347	617	775	769	874	570	497	506
Net annual growth	450	655	879	923	838	544	473	591	577	512
Inventory[4]	6,862	10,200	14,042	16,506	16,184	16,288	13,312	10,465	11,007	11,717
Upland hardwoods										
Roundwood supplies[1]	84	88	89	188	306	137	147	192	217	212
Timber removals[2]	94	90	93	195	315	144	151	198	221	216
Net annual growth	142	207	284	340	354	191	124	146	170	184
Inventory[4]	2,604	3,744	5,058	6,119	5,694	8,392	8,585	8,158	7,582	7,084
Bottomland hardwoods										
Roundwood supplies[1]	82	89	133	112	175	164	204	238	256	254
Timber removals[2]	88	90	139	115	180	173	214	247	264	259
Net annual growth	178	257	241	233	245	252	192	187	198	213
Inventory[4]	4,004	5,631	6,402	7,324	7,996	9,605	9,942	9,543	8,872	8,201
All management types										
Roundwood supplies[1]	3,072	2,846	3,524	4,462	5,049	5,405	5,821	6,146	6,567	6,589
Timber removals[2]	3,233	2,930	3,686	4,717	5,362	5,691	6,074	6,356	6,737	6,721
Net annual growth	3,667	4,681	5,586	6,063	5,720	5,257	6,090	6,801	7,104	7,254
Inventory[4]	58,247	72,907	86,297	97,981	101,836	96,717	91,512	92,812	96,847	100,935

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

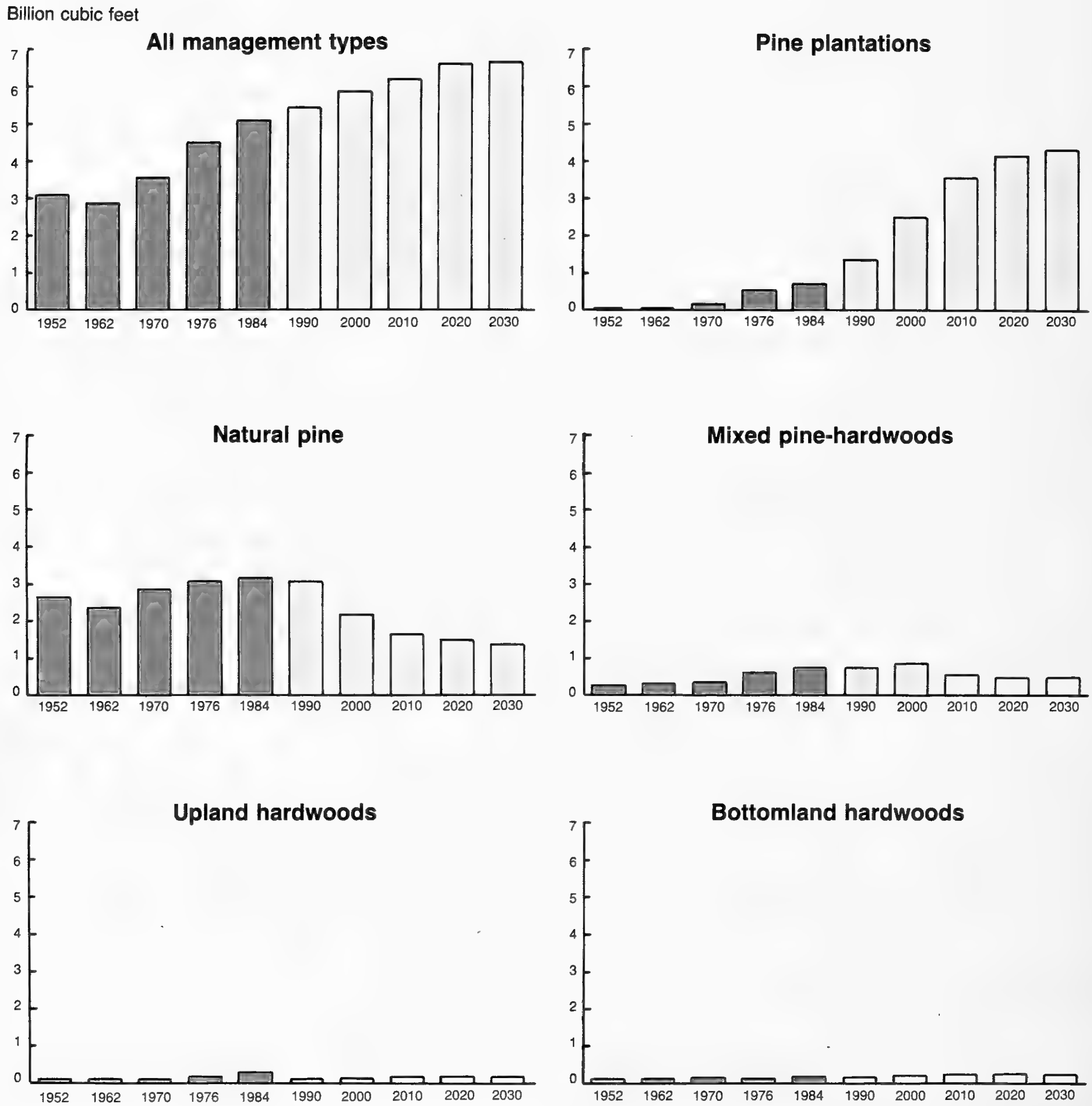


Figure 3.18—Softwood roundwood supplies in the South by forest management type, 1952–84, with projections to 2030

The major change in the source of the projected softwood supplies by forest management type is a continuing shift from natural stands to pine plantations. By the year 2000, annual softwood supplies from pine plantations are projected to increase to 2.5 billion cubic feet, which would be 43 percent of the total. To the extent that wood properties of the plantation trees differ from those of trees grown in natural stands, this shift could be significant. Appendix tables 3.35–3.48 show historic trends and State allocations of the projections of softwood supplies by forest management type.

Beyond 2000, the base projections point toward some further increase in softwood supplies to 6.6 billion cubic feet in 2020. There is little change, however, between 2020 and 2030. The prospective shift in source from natural stands to pine plantations continues. By 2030, pine plantations are projected to provide 65 percent of total supplies.

Trends in the Southeast

In 1952, timber supplies, (harvests) in the Southeast were just under 1.8 billion cubic feet of softwood roundwood. Sawlogs accounted for more than half of this volume. Although the total number of sawmills in the Southeast had begun to decline, the annual production of softwood lumber in the region was averaging about 5.0 billion board feet. Several thousand small portable sawmills produced a very large share of the lumber in the region. Pulpwood supplies had surpassed fuelwood and were increasing very rapidly. Pulp and paper companies were constructing new mills throughout most of the region. Other private forest lands provided about 78 percent of all softwood supplies (app. table 3.21). About 96 percent of all softwood timber supplies came from natural pine stands (app. table 3.35).

By 1962, softwood roundwood supplies in the Southeast had declined to just over 1.5 billion cubic feet per year. Although the annual production of round softwood pulpwood had increased from 7 million to more than 10 million cords, the annual production of softwood lumber in the region had dropped from 5.0 billion to 2.7 billion board feet. In some areas of the region, pulpwood surpassed sawlogs as the leading timber product. The number of sawmills decreased dramatically as small portable mills went out of production. There was little change in the sources of softwood supplies from 1952. Other private land still provided about 76 percent, and 95 percent of all softwood roundwood supplies still came from natural pine stands.

By 1970, the decline in softwood supplies had been reversed, and annual output was back up to 1.7 billion cubic feet. The annual production of round softwood pulpwood exceeded 13 million cords. Softwood pulpwood supplies were more than double softwood sawlog supplies.

However, the lumber industry was being rapidly modernized, and lumber production in the region had also turned upward. Fewer but more efficient sawmills had replaced a large number of the older mills. Many of the new sawmills had chipping headrigs, which convert portions of each log to chips as the log is first broken down for lumber. The pine plywood industry established in the region in the early sixties continued to expand, and the pine peeler log was becoming a major product. Although other private land remained the primary source of softwood supplies, its share dropped to 65 percent. Timberland owned and leased by forest industries was now supplying 29 percent of the softwood roundwood. The portion of softwood roundwood from natural pine stands had dropped to 88 percent.

By 1976, softwood roundwood supplies from the Southeast had climbed to 2.1 billion cubic feet. Although the long upward trend in the annual production of round softwood pulpwood had begun to level off somewhat, softwood pulpwood remained the region's leading timber product. The rapid expansion of the pulp and paper industry in the Southeast began to slow. Softwood plant byproducts and hardwood provided a larger share of the pulp furnish. Softwood sawlog supplies increased to feed the recovery of the region's softwood lumber industry. The region also experienced an almost threefold increase in the output of softwood veneer logs between 1970 and 1976.

By ownership, other private land provided 63 percent of the softwood supplies in 1976, while forest industry provided 30 percent from its own land. The remaining 7 percent came from public land. The portion of softwood roundwood from natural pine stands declined to 74 percent as pine plantations and mixed pine–hardwood stands began to provide more of the annual harvest. Georgia was the leading source of softwood timber in the region and provided 39 percent of the total (fig. 3.19).

In 1984, softwood roundwood supplies in the Southeast were close to 2.5 billion cubic feet, an increase of 63 percent since 1962. However, softwood supplies have leveled off at least partially in response to an increase in the import of softwood timber products from Canada.

The rapid increase in softwood supplies from the Southeast over the past two decades is projected to slow down. Projected supplies in 2000 are 14 percent above current supplies. By 2020, softwood supplies are projected to

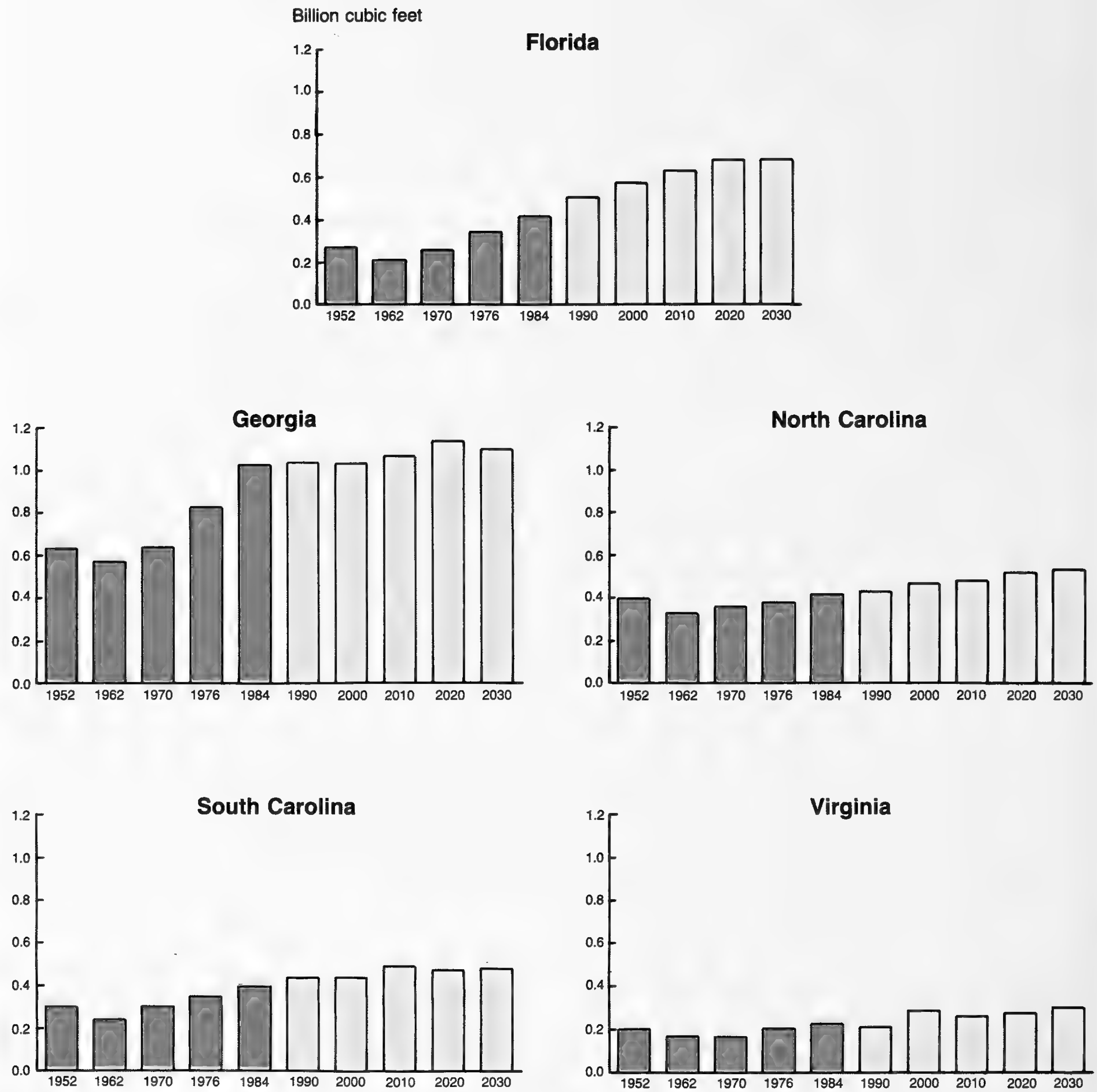


Figure 3.19—Softwood roundwood supplies in the Southeast region by State, 1952–84, with projections to 2030

A few decades ago in the 1940's, there were tens of thousands of small circular sawmills in the South. Most of these mills are gone. The sawmills of today are larger and much more efficient. Many have chipping headrigs, which convert portions of each log to chips for use in the pulp industry.

increase to 3.1 billion cubic feet, or 25 percent above current levels. There is a slight decline after 2020.

Most of the projected increase will be from forest industry land, where softwood supplies rise 85 percent by 2030. Forest industry land is projected to provide 46 percent of the softwood supplies in 2030, compared to the 31 percent actually supplied in 1984. Softwood supplies from other private land are projected to decrease by 7 percent. A 47-percent decrease in softwood supplies from farmer ownerships more than offsets the increase from corporate holdings. Projected supplies from land owned by other private individuals show little change.

The major change in the source of projected softwood supplies by forest management type is the shift from natural stands to pine plantations. Currently, pine plantations in the Southeast provide about 430 million cubic feet of softwood supplies each year, or about 17 percent of the total. By 2000, pine plantations will supply almost half of the softwood; by 2030 they will supply more than two-thirds.

Trends in the South Central Region

In the South Central region, softwood timber supplies were stable at about 1.3 billion cubic feet during the 1950's but then began to rise, reaching a total of 2.6 billion cubic feet in 1984. This harvest increase was primarily due to expansion of the pulp and plywood industries and increased lumber production.

Annual softwood pulpwood production rose from 6.4 million cords in 1962 to 12.7 million cords in 1984. Plant capacity tripled during the same period, from 22,000 to 65,000 tons per day. The total number of pulp mills rose from 42 to 59, and average mill capacity increased from 500 to more than 1,100 tons per day. Most of the pulping capacity increase has occurred in the Coastal Plain States of Alabama, Mississippi, and Louisiana, and the eastern part of Texas. Currently, Alabama leads South Central States in pulping capacity with 26 percent of the total.

Softwood sawlog production dropped from 4.2 billion board feet to 3.2 billion board feet between 1952 and 1962 as many small sawmills closed down. Production then began rising to its current annual level of about 6.0 billion board feet. The softwood plywood industry became significant by 1970 and by 1976 consumed 2.5 billion board feet annually.

Of the 1.3 billion cubic feet of softwood supplied in 1952, 61 percent came from other private owners and 29 percent from forest industry (app. table 3.22). Most of the harvest, 90 percent, came from natural pine and mixed pine–hardwood stands (app. table 3.36). Softwood sawlogs accounted for 53 percent of softwood supplies.

Softwood sawlog production had fallen dramatically by 1962. No major changes in ownership of the softwood harvest were evident, and the source of most of the timber remained natural pine and mixed pine–hardwood stands.

As the pulp and paper industry expanded in the South, total softwood supplies jumped from 1.3 to 1.8 billion cubic feet between 1962 and 1970. The harvest of natural pine increased to 74 percent of roundwood supplies, and the proportion supplied by forest industry increased to 38 percent. Alabama, Louisiana, and Texas led the softwood supply increase (fig. 3.20). Lumber accounted for only 38 percent of softwood supplies in 1970, while pulpwood jumped to 48 percent.

By 1976, softwood supplies had again increased, to 2.4 billion cubic feet. The proportion coming from industry lands rose to 39 percent. The proportion by forest type shifted from natural pine, which fell to 64 percent, to mixed stands and pine plantations, which accounted for 18 percent and 7 percent, respectively.

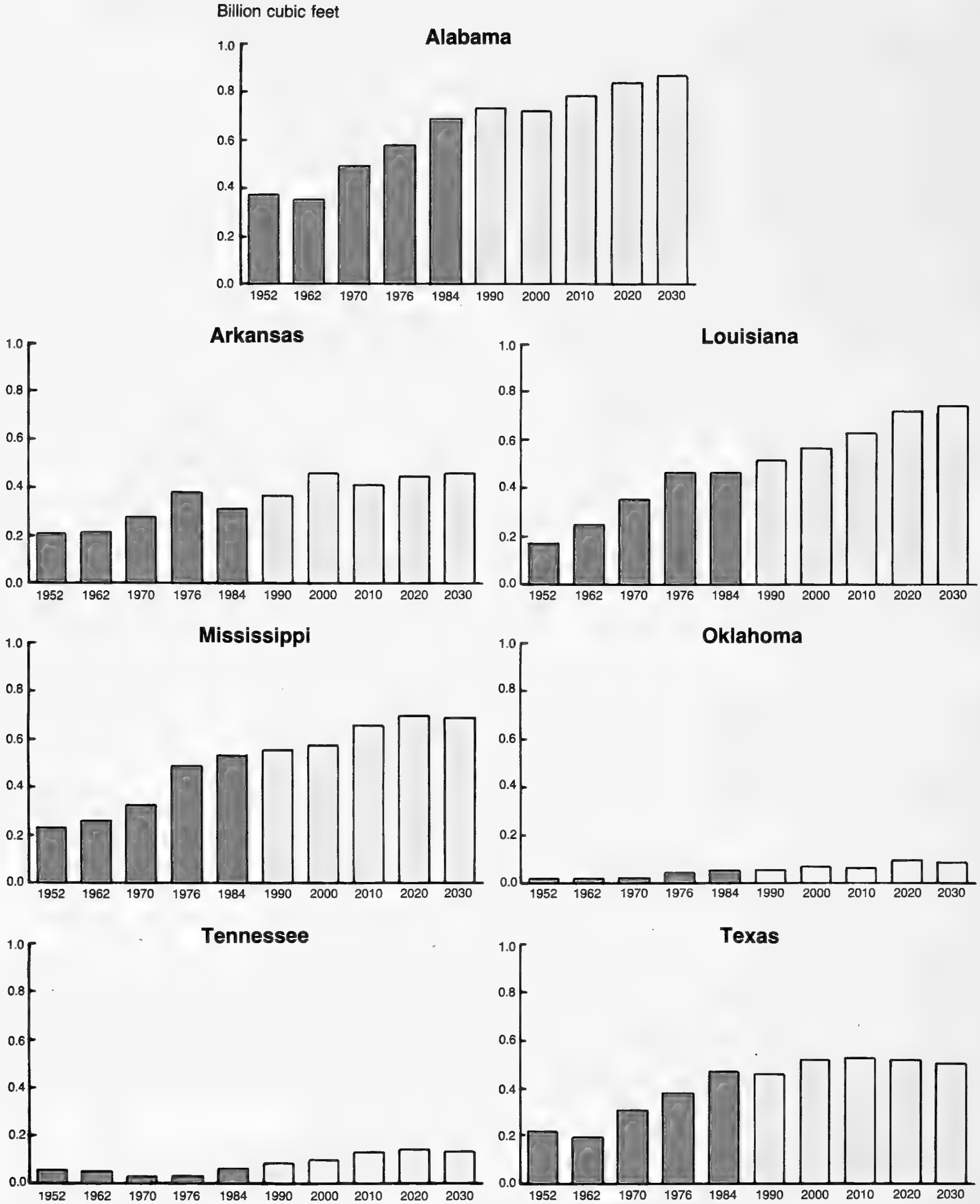


Figure 3.20—Softwood roundwood supplies in the South Central region by State, 1952–84, with projections to 2030

Current softwood supplies in the South Central region average 2.6 billion cubic feet per year. The proportion supplied by the various owner groups has been stable since 1976. Supplies from all management types continue to increase, but pine plantations now account for 10 percent of all softwood supplies.

Softwood supplies from the South Central region are projected to increase 17 percent by 2000 and 36 percent by 2030, when they amount to 3.5 billion cubic feet. Increases from forest industry land, where softwood supplies rise by 60 percent, account for most of the additional supply. Prospective softwood supplies from other private land increase 12 percent by 2030 and then decline slightly. By 2030, forest industry land is projected to provide 46 percent of the softwood supplies, compared to about 39 percent in 1984.

In the South Central region, more of the projected softwood supplies come from public timberland than in the Southeast. For example, softwood supplies from national forests in the South Central region more than double between now and 2030. Altogether, public lands will provide about 10 percent of the total softwood supplies from the South Central region.

By 2000, pine plantations will provide about 37 percent of the softwood supplies and by 2030, 63 percent. Softwood supplies from natural pine decline rapidly between now and 2000, from 59 percent of the total to 38 percent. By that time, conversion of most of the suitable natural pine stands to planted pine will have taken place. Softwood supplies from mixed pine–hardwood stands are projected to drop sharply after 2000.

Trends by State

In 1952, Georgia, North Carolina, Alabama, and South Carolina were the leading State suppliers of softwood roundwood. Collectively, they provided 55 percent of the region's total (app. tables 3.23–3.34 and 3.37–3.48). Between 1952 and 1976, Georgia and Alabama retained their leading positions, but there was considerable shift from east to west in the sources of softwood supplies. Mississippi and Louisiana surpassed North and South Carolina as leading suppliers. During this period, there were also large increases in softwood supplies from Texas and Arkansas.

Between 1976 and 1984, the largest increases occurred in Georgia, Alabama, and Florida, as the shift from east to west reversed. In 1984, Georgia, Alabama, Mississippi, and Louisiana were the leading State suppliers and provided 54 percent of the total.

Between now and 2000, most of the increase in softwood supplies is projected to occur in Florida, Arkansas, and Louisiana. By 2000, softwood supplies from these three States combined are projected to exceed their combined 1984 output by about 35 percent. In each of these States, net annual growth of softwood exceeded annual removals by 15 percent or more as of 1984. In Arkansas and Louisiana the percent of the softwood inventory in sawtimber stands is significantly higher than the regional average. In Florida, there are extensive acreages of pine plantations that will be available for harvest between now and 2000.

Large percentage increases in softwood supplies are projected for Oklahoma and Tennessee; however, the actual quantities are smaller than those in the three States mentioned. The prospective increase in softwood supplies from Virginia is also somewhat higher than the regional average, and a 13-percent increase is projected for North Carolina.

In the other five States—Alabama, Georgia, Mississippi, South Carolina, and Texas—very small increases in softwood supplies are projected between now and 2000. Recent forest surveys show either a softwood growth deficit or a very tight growth-removal situation in each of these States. In most, recent trends reflect the rapid liquidation of large inventories of pine timber that developed on idle agricultural land between about 1945 and 1965. Beyond 2000, softwood supplies are again projected to increase in most of these States.

Recent and Projected Softwood Timber Removals

Timber removals are defined as all human-caused removals of growing stock from the inventory on timberland, based on the same merchantability standards used in the inventory. In addition to roundwood product output, they include logging residue and other removals of growing stock associated with land-use changes and timber cultural practices. Generally, these trend-level estimates of growing-stock removals are based on periodic remeasurements of permanent sample plots at 5- to 10-year intervals.

Southwide Trends

Trends in the annual removals of softwood growing stock in the South follow a pattern similar to that described for softwood roundwood supplies (tables 3.15 and 3.16, fig. 3.21). Generally, timber products output accounts for 85 to 90 percent of the annual removals of softwood growing stock with the remainder being about equally divided between logging residue and other removals. Between 1952 and 1962, annual removals of softwood growing stock decreased by 9 percent, from 3.2 billion to 2.9 billion cubic feet. This decrease is attributed to the decline in the output of softwood sawlogs during the period and to some improvement in utilization.

Since 1962, annual removals of softwood have increased to 5.4 billion cubic feet, or by 83 percent. Most of this increase can be attributed to increases in softwood product output and the logging residue associated with the harvests.

Timber removals—the volume of timber removed from growing stock inventories on timberland—include the volume of timber cut for products, logging residues (the material left in the woods after logging), and the timber removed from inventories through land-use changes and timber cultural practices.

Still, there are significant quantities of other removals. A rapid rate of urban development and other land-use changes affecting timberland continue to remove substantial quantities of softwood growing stock from the inventory each year. In many cases, the trees are not actually cut but are removed from the inventory through a change in land-use classification. In addition, substantial amounts of growing stock are removed in site preparation and other timber cultural practices. Generally, producers require some minimum volume per acre for a profitable harvest opportunity.

Just as with softwood roundwood supplies, well over half of the softwood removals still come from other private timberland (table 3.15, fig. 3.21). The share from these other private lands is decreasing, however, as more of the removals come from forest industry lands. Not only are forest industries continuing to harvest and convert extensive acreages of natural pine stands to pine plantations, they now have more merchantable-size plantation timber to harvest on their own lands. Over the past 30 years, the share of softwood removals coming from industry lands has increased from 23 to 35 percent, while the share from other private lands has declined from 71 to 58 percent.

By 2000, annual softwood removals in the South are projected to increase to 6.1 billion cubic feet, an estimate 13 percent above current levels. As with the projections of softwood supplies, much of this increase is expected to take place on forest industry lands, where annual softwood removals are projected to increase from 1.9 billion to 2.4 billion cubic feet, or by 26 percent. A 2-percent increase is projected on other private lands. The projections suggest a 45-percent increase in softwood removals from public timberland between now and 2000.

Beyond 2000, removals continue to rise until 2020, when they reach 6.7 billion cubic feet, 26 percent above 1984 levels. This is followed by a small decline.

By forest management type, the most significant change in softwood removals in the South has been a shift from natural pine stands to pine plantations (table 3.16, fig. 3.22). About 13 percent of the softwood removals now come from pine plantations, and this share is expected to increase in the years ahead. Since 1952, the share of softwood removals coming from natural pine stands has decreased from 85 percent to 63 percent.

Again, the projected increase in softwood removals occurs in pine plantations. Between now and 2000, annual removals of softwood from pine plantations are projected to increase almost fourfold, from 0.7 billion to 2.6 billion cubic feet. Softwood removals from natural pine stands are projected

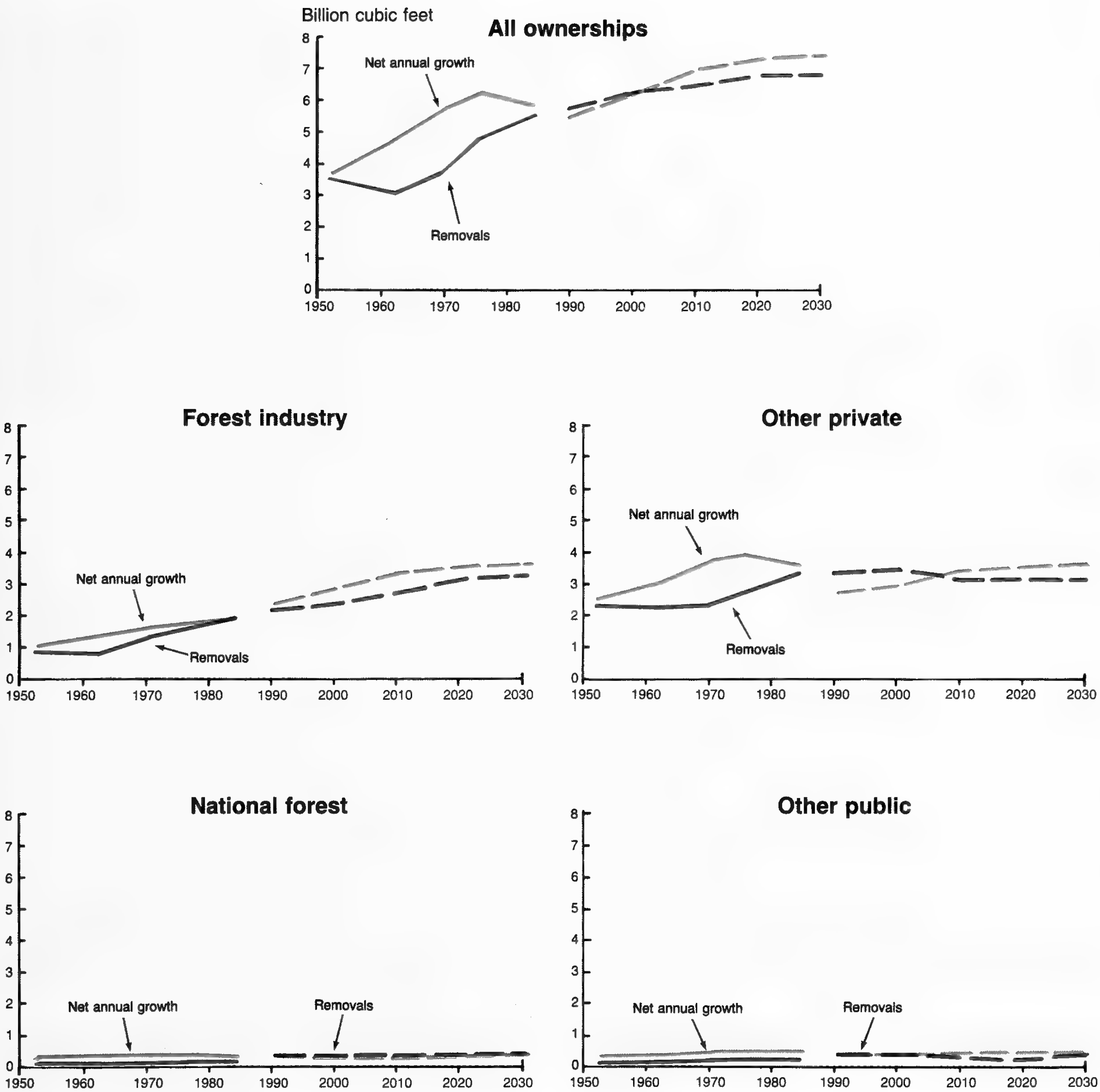


Figure 3.21—Softwood net annual growth and timber removals in the South by forest ownership, 1952–84, with projections to 2030

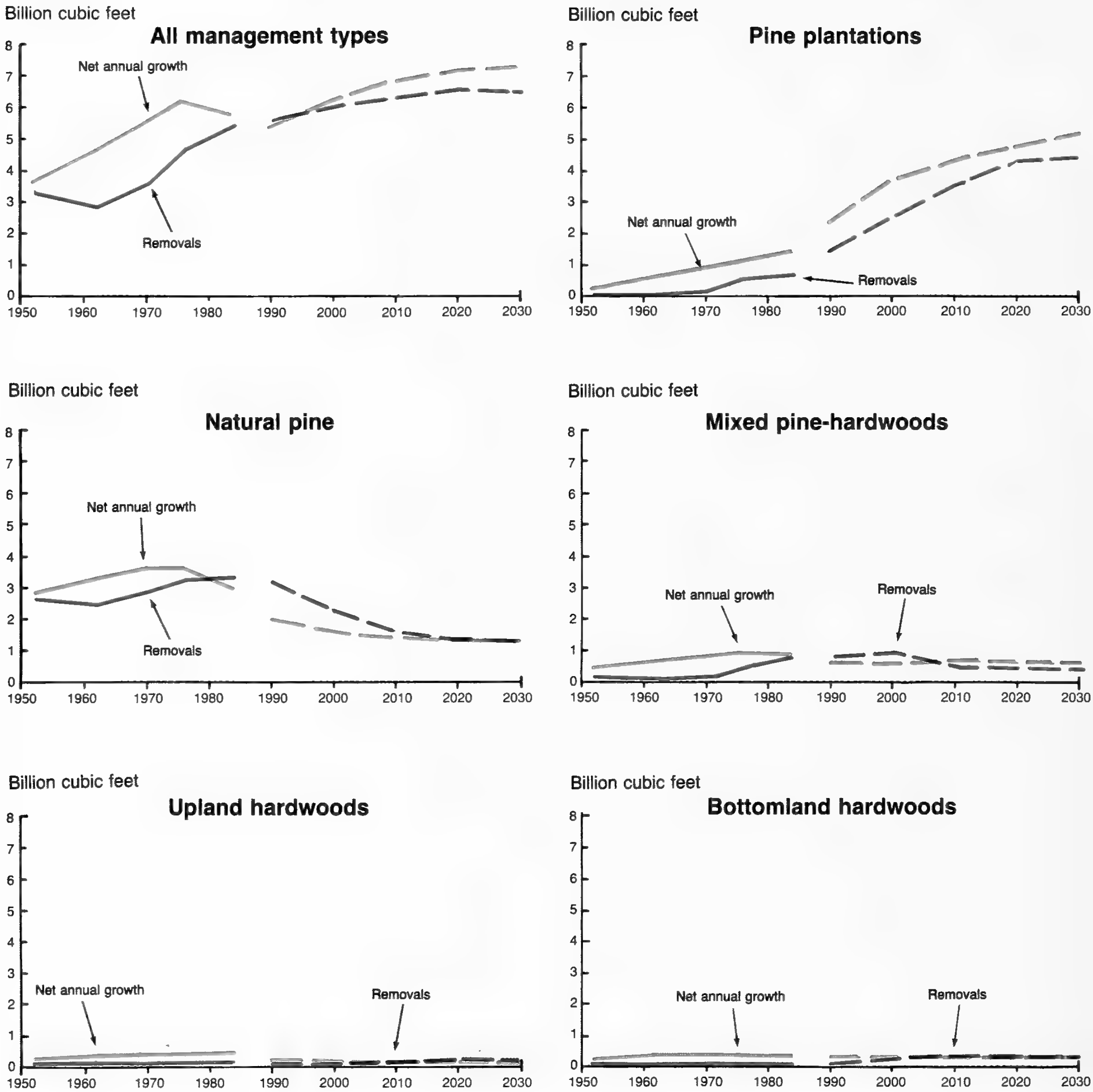


Figure 3.22—Softwood net annual growth and timber removals in the South by forest management type, 1952–84, with projections to 2030

to decrease by 34 percent. These trends continue through 2030.

Trends in the Southeast

Between 1952 and 1962, softwood timber removals in the Southeast decreased by 14 percent as declines in the softwood lumber industry more than offset rapid expansion in the pulp and paper industry (app. tables 3.21 and 3.35). Between 1962 and 1970, softwood removals increased back to near the 1952 level.

Between 1970 and the early 1980's, softwood timber removals in the Southeast rose by almost 50 percent. This increase occurred across all States (fig. 3.23) and on all ownerships and management types. This reflected rising demands for softwood pulpwood, sawlogs, and veneer logs. By 1984, annual removals of softwood had reached 2.7 billion cubic feet, but the rate of increase was slowing.

By 2030, annual removals of softwood in the Southeast are projected to increase to 3.2 billion cubic feet, or to 17 percent above current levels. These results indicate a significant slowdown in the rate of increase in softwood removals from the rate over the past 20 years.

Most of the additional increase will occur on forest industry land, where annual softwood removals are projected to increase by 72 percent. By management type, most of the additional increase occurs on pine plantations, where more than a fourfold increase is projected.

Trends in the South Central Region

Softwood removal trends in the South Central region are very similar to trends in softwood supplies since removals from growing stock comprise such a large percentage of timber supplies. After a slight decline between 1952 and 1962, total softwood removals increased steadily through 1976 and then increased more slowly to current levels. Total removals of softwood growing stock in the South Central region reached 2.7 billion cubic feet in 1984 (app. tables 3.22 and 3.36). The most significant recent increases have occurred in Alabama (fig. 3.24).

By ownership category, removals have increased by 74 percent for other private owners and by 160 percent for forest industry owners since 1962. The latter jump reflects trends in timberland acreage as well as the increasing management intensity practiced on forest industry timberlands. Softwood removals from plantations have been increasing.

By 2030, annual removals of softwood in the South Central region are projected to increase to 3.6 billion cubic feet, or to 34 percent above current levels. As in the Southeast, these results indicate a slowdown in the rate of increase in softwood removals from the rate over the past 20 years.

Most of the increase in the South Central region will occur on forest industry land, where annual softwood removals are projected to go up by almost 58 percent by 2030. Large increases are also projected on other corporate holdings as well as on national forests. By management type, most of the additional increase occurs on pine plantations, where an eightfold increase is projected. Softwood removals from natural pine and mixed pine–hardwood stands are projected to be about half of the current level by 2030.

Trends by State

Between 1952 and 1962, softwood timber removals declined in every State except Arkansas, Louisiana, and Oklahoma as softwood supplies (harvests) decreased (figs. 3.23 and 3.24, app. tables 3.23–3.34 and 3.37–3.48). In terms of volume, the largest decreases occurred in North Carolina, Florida, and South Carolina. Between 1962 and 1970, softwood removals turned back up in every State except Tennessee and Virginia. Since forest surveys in Virginia indicated softwood removals were exceeding net growth, there was some pullback in the rate of softwood harvest in the State. Earlier surveys had measured a softwood growth deficit in Tennessee.

Between 1970 and 1976, softwood removals rose in every State. In terms of volume, the largest increases occurred in Georgia, Mississippi, Florida, Arkansas, and Louisiana. Between 1976 and 1984, the largest increases were in Georgia, Alabama, South Carolina, Texas, Florida, and Mississippi, where there was a rapid harvest of pine timber that grew on idle cropland and pasture between 1945 and 1965.

The projected changes in softwood removals follow a pattern similar to that described for softwood supplies. For example, the largest increases in softwood removals between now and 2000 are projected for Arkansas, Florida, and Louisiana. Prospective increases in Virginia, North Carolina, Tennessee, and Oklahoma are also greater than the regional average. Beyond 2000, the projected increases in softwood removals are greatest in Louisiana, Alabama, and Mississippi. Again, the largest percentage increase is in Tennessee.

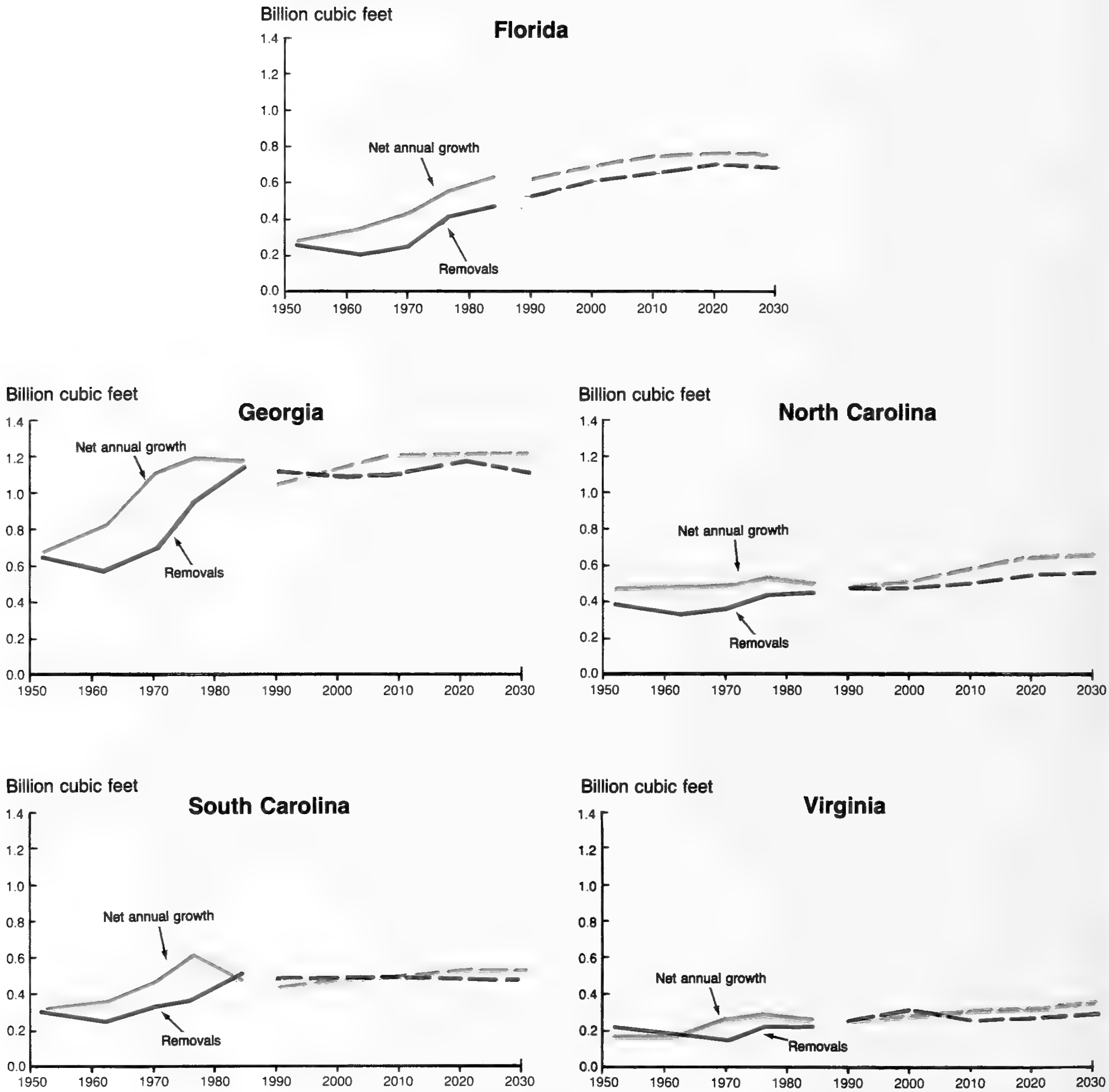


Figure 3.23—Softwood net annual growth and timber removals in the Southeast region by State, 1952–84, with projections to 2030

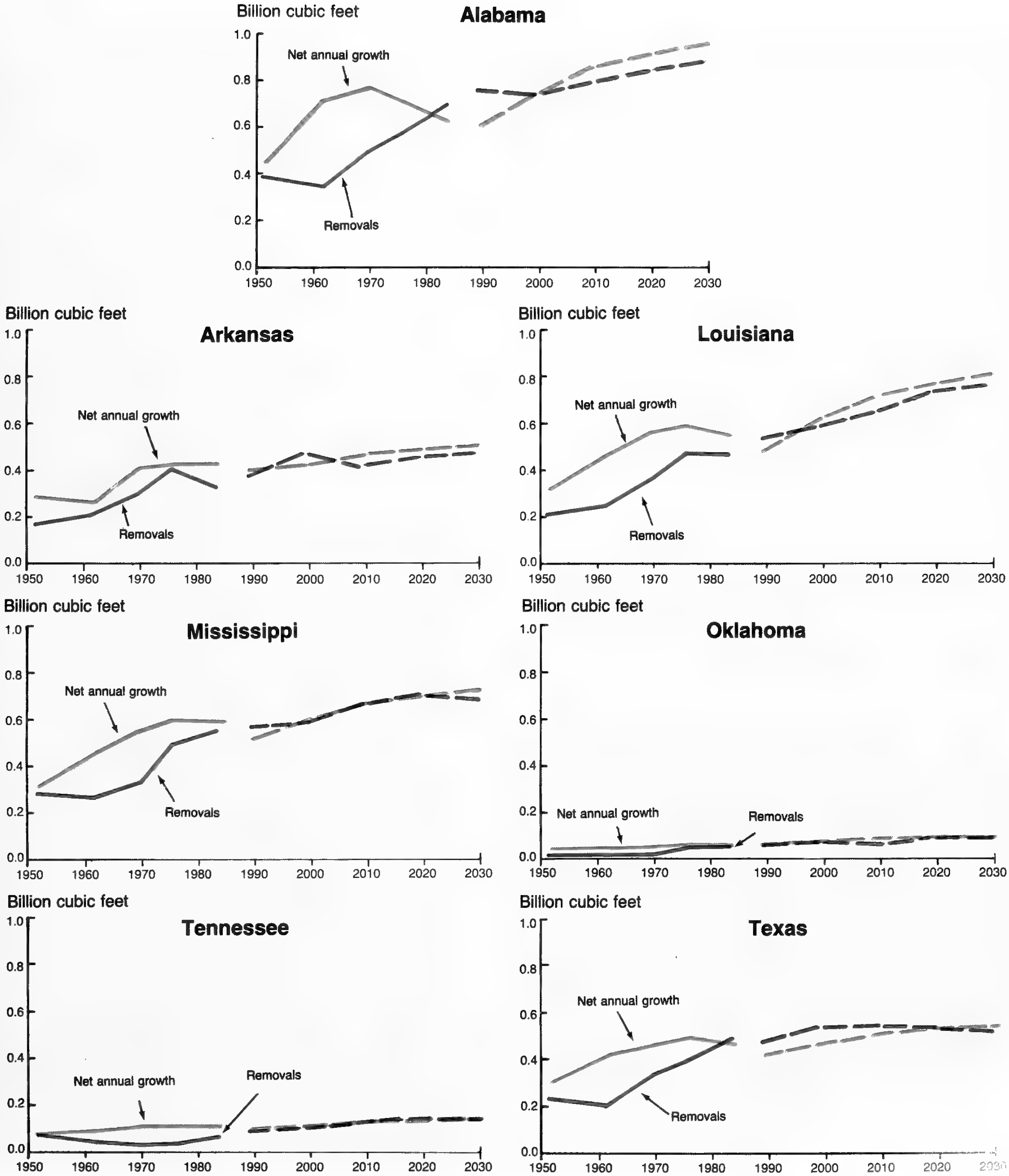


Figure 3.24—Softwood net annual growth and timber removals in the South Central region by State, 1952–84, with projections to 2030

Recent and Projected Softwood Net Annual Growth

Net annual growth is the net change in merchantable, growing stock volume for a specific year in the absence of removals. In the estimates of net growth, mortality has already been deducted. The more recent estimates of net annual growth are based on periodic remeasurements of permanent sample plots at 5- to 10-year intervals.

Southwide Trends

After a long upward trend in net annual growth of softwood in the South, recent forest surveys have been measuring declines in many areas (fig. 3.21, tables 3.15 and 3.16). Between 1952 and 1976, net annual growth of softwood growing stock increased from 3.7 billion to 6.1 billion cubic feet, or by 65 percent. Since 1976, softwood growth has peaked, at least temporarily, and turned downward. In 1984, the net annual growth of softwood totaled 5.7 billion cubic feet. These changes in net annual growth have several causes, which are covered in detail in later discussions.

Most of the recent decline in softwood growth has occurred on timberland in other private ownerships (table 3.15, fig. 3.21). Between 1976 and 1984, net annual growth of softwood on farmer lands in the other private category decreased 28 percent; on other individual holdings the decrease was 6 percent. In contrast, net annual softwood growth increased 12 percent on forest industry lands.

The base projections suggest the recent downturn in net annual growth of softwood in the South will continue until near the turn of the century, at that time softwood growth turns back up. Between 1984 and 1990, net annual growth of softwood is projected to decrease from 5.7 billion to 5.3 billion cubic feet, or by about 8 percent. The downturn is caused by actions already taken or forgone. Although there is evidence of recent improvement in the rates of pine regeneration on other private lands, it will take 10 or more years for the planted trees to reach merchantable size.

Most of the decrease in net annual growth by 1990 occurs on other private land, where it is projected to drop by 24 percent. Beyond 1990, softwood growth on other private land climbs back to 3.2 billion cubic feet in 2030, just slightly lower than in 1984. On forest industry land, softwood growth increases throughout the projection period reaching 3.4 billion cubic feet by 2030, some 85 percent above current growth.

The projected increase in timber growth on private ownerships is based on the expectation that investments in timber management programs will be much above those of today. For example, it was assumed that by 2030 the area in pine plantations will be doubled and that large areas of mixed pine–hardwoods and upland hardwoods will be converted to pine. The necessary planting and conversion would require about $2.7 billion. Substantial increases in timber yields and the intensity of management were also assumed for large areas of pine plantations. Thus, the projected increases in net annual softwood growth show only what would happen if there continues to be a lot of progress in forestry in the South and continued expansion in technical and financial assistance, protection, research, education, and management programs that have brought about the increases in growth in the past.

On public timberlands, net annual softwood growth is projected to drop about 11 percent by 2000. Some of the prospective decline is attributed to the aging of pine stands being carried over long rotations for sawtimber. There is a small increase in growth between 2000 and 2030.

As with removals, the major change in softwood growth trends by forest management type has been a shift from natural pine stands to pine plantations (fig. 3.22, table 3.16). Softwood growth in pine plantations has nearly doubled over the past 15 years and now accounts for almost one-fourth of the total. In natural pine and mixed pine–hardwood stands, softwood growth is down 15 percent from the level in 1976. Only 10 percent of the softwood growth occurs in hardwood stands, and this includes the growth of cypress in bottomland hardwood stands.

The prospective decline in softwood growth occurs in natural stands. Net annual growth of softwood in pine plantations is expected to more than double between now and the year 2000. More than 60 percent of the softwood growth in the region will be in plantations by then. Softwood growth in pine plantations in 2030 is nearly four times that in 1984.

Trends in the Southeast

Recent forest surveys have measured significant reductions in the net annual growth of softwood in the Southeast (app. tables 3.21 and 3.35). After rising for decades, net annual growth of softwood growing stock seems to have peaked around 1980 at about 3.1 billion cubic feet and then dropped to 2.9 billion cubic feet in 1984.

Most of the reduction has been in natural pine and mixed pine–hardwood stands on other private timberlands in the Piedmont and mountains. In these parts of the Southeast, growth of pine is also down on public land but shows little change on industry land. Overall, net annual growth of pine

in the Piedmont and mountains is down about 25 percent. This decline has just about offset a 20-percent increase in the net annual growth of pine in the Coastal Plain. Most of the increase in the Coastal Plain can be attributed to the development of extensive acreages of pine plantations on forest industry land. Net annual growth of pine on forest industry land is up more than 50 percent between the two most recent surveys.

To date, resource analysts have identified at least four major factors causing the reduction in pine growth (Sheffield and others 1985): (1) a continuing decline in area of timberland, (2) inadequate pine regeneration on other private land following harvesting, (3) a sharp increase in annual mortality, and (4) reductions in the rates of tree diameter and stand basal-area growth in parts of the region. Although it is difficult to quantify how much of the overall reductions in volume growth has been caused by each of these factors, they all have contributed to the decline in significant ways.

Decline in Area of Timberland—Past land use changes in the Southeast have significantly affected timber growth in the region (Boyce and Knight 1980). Major shifts in land use since 1945 are particularly relevant to the recent reduction in pine timber growth. Between 1945 and 1969, the area of cropland harvested in the Southeast dropped by more than 10 million acres according to statistics from the U.S. Census of Agriculture. Much of the former cropland regenerated naturally or was planted to trees, and the area of timberland in the region increased by 4.4 million acres.

During this period, natural seeding and planting of pine trees on idle cropland more than compensated for the failure to regenerate pine stands after harvests. Today's age distribution of pine and mixed pine–hardwood stands on other private land in the Southeast reflects the high rate of pine establishment between 1945 and 1965. More than 40 percent of all pine and mixed pine–hardwood stands on other private land are between 20 and 40 years old.

In the 1960's the acreage of cropland harvested bottomed out, and since 1969 the region has experienced an increase in cropland largely caused by a rise in the production of soybeans. The area of cropland harvested has increased by 3.6 million acres. Many acres of timberland have been cleared for agriculture. In addition, conversion of timberland to urban uses continues at the rate of 170,000 acres annually. The net result has been a 6.1-million-acre decrease in area of timberland since 1962.

Because of this turnabout in cropland acreage, a major source of pine regeneration on other private land has dried up. Since many private owners in the region fail to regenerate their pine stands after harvest, many of the acres retained in timberland have reverted to hardwoods. In the absence of any large-scale establishment of pine on nonforest land, the area of young pine stands on other private land dropped rapidly. As a result, there are 30 percent

One of the causes of the declining trend in net annual softwood growth in the South has been the decrease in timberland area resulting from the conversion of timberland to crop and urban uses.

Another factor causing the reduction in net annual softwood growth in the South is inadequate regeneration of pine after timber harvests on other private ownerships. Most of these owners accept whatever regeneration nature provides after harvest. Mixed pine–hardwoods or hardwoods naturally replace pine stands after harvest over much of the South.

fewer pine and mixed pine–hardwood stands 20 years old and younger than similar stands between 20 and 40 years old.

Based on the 1982 statistics from the Census of Agriculture, the increase in area of cropland harvested in the Southeast has almost halted; however, timberland is still being rapidly diverted to urban and related uses. The pine and mixed pine–hardwood types experienced a 2.7-million-acre net decrease between 1977 and 1985. Most of the decline has been on other private land.

Inadequate Regeneration on Other Private Lands—Another factor causing the reduction in net annual pine growth is inadequate regeneration on other private land after harvesting. While recent forest surveys show some improvement in the regeneration on such land, the record during the 1960's and 1970's was not good. Many private owners accept whatever regeneration nature provides after timber harvests. In many cases, hardwoods or mixed stands of pine and hardwood replace pine without some intervention on the part of the landowner. Changes on other private land are especially important because these owners account for about two-thirds of the timberland in the Southeast.

Over the past 10 years, the area of other private land harvested and kept in timber has averaged about 950,000 acres each year. This figure includes both final harvesting and high grading but excludes thinning and other intermediate cutting. Of these 950,000 acres harvested, 610,000 acres supported pine or mixed pine–hardwood stands prior to harvest. On other private land, the total area successfully regenerated to pine or mixed pine–hardwood averaged about 330,000 acres, or less than 55 percent of the pine and mixed pine–hardwood acreage harvested. Over the same 10-year period, area regenerated by planting to pine averaged less than 20 percent of the acreage of pine and mixed pine–hardwood harvested.

Planting statistics indicate the annual rate of planting on other private land has increased significantly in recent years. Planting on other private land occurred on approximately 400,000 acres in 1984 and 500,000 acres in 1985. Still, the rate of planting is much below that of harvesting.

About 1970, the consequences of inadequate pine regeneration on other private land and the absence of widespread pine seeding onto idle cropland began to show up in the forest survey statistics as reductions in numbers of pine saplings. The latest cycle of surveys shows 40- to 50-percent declines in the numbers of pine saplings on other private land. More important, these declines in tree numbers have now progressed up into the 6- and 8-inch diameter classes, where they are affecting ingrowth and inventory volumes (fig. 3.25). Since some of the sharp decrease in numbers of pines can be attributed to the shift from dense natural stands to plantations, prospective declines in the larger diameter classes are somewhat smaller than those anticipated in saplings. A 60-percent increase in the number of 6-inch pines on industry land over the past 10 years only partially compensated for the loss of 6-inch pines on other private land.

Increase in Annual Mortality—A third factor affecting the reduction in net growth is a sharp increase in the mortality of timber. Pines have experienced the largest increase in mortality. Statistics indicate 15 percent of the gross annual growth of southern pine is now lost to mortality, compared to 9 percent 10 years ago. In timber volume, the annual mortality of pine has increased about 80 percent over the past decade (table 3.17).

Much of the increase in mortality can be attributed to periodic outbreaks of pine bark beetles over fairly extensive areas. Forest survey statistics suggest that insects account for 35 to 40 percent of the softwood mortality in the Southeast each year. Suppression is the second leading identifiable cause of death, followed closely by disease. Fusiform rust, littleleaf disease, and annosus root rot are the three leading diseases affecting pines in the region.

Reductions in Growth Rates—A fourth factor affecting the slowdown in growth is measured reductions in the rates of tree diameter and stand basal-area growth for natural pines in parts of the region. To date, forest survey has measured significant declines in the Piedmont and mountains of Georgia, South Carolina, North Carolina, and Virginia. In these regions, average annual radial increments of pines determined from remeasurements of sample trees at breast height have averaged some 20 to 30 percent lower over the past 10 years than over the previous 10.

A reexamination of older forest survey data on rates of tree growth indicates the decline extends back even further than the past 10 years and also shows up in parts of the Coastal Plain in earlier remeasurement periods. The slowdown in diameter growth at breast height on individual trees was not detected earlier because it was more than offset by increases in stocking and stand age. It is conceded that a slowdown in the average rate of growth of individual trees at d.b.h., by diameter class, is not conclusive evidence of an overall slowdown in softwood growth. Further study, however, shows a slowdown in average stand growth expressed in

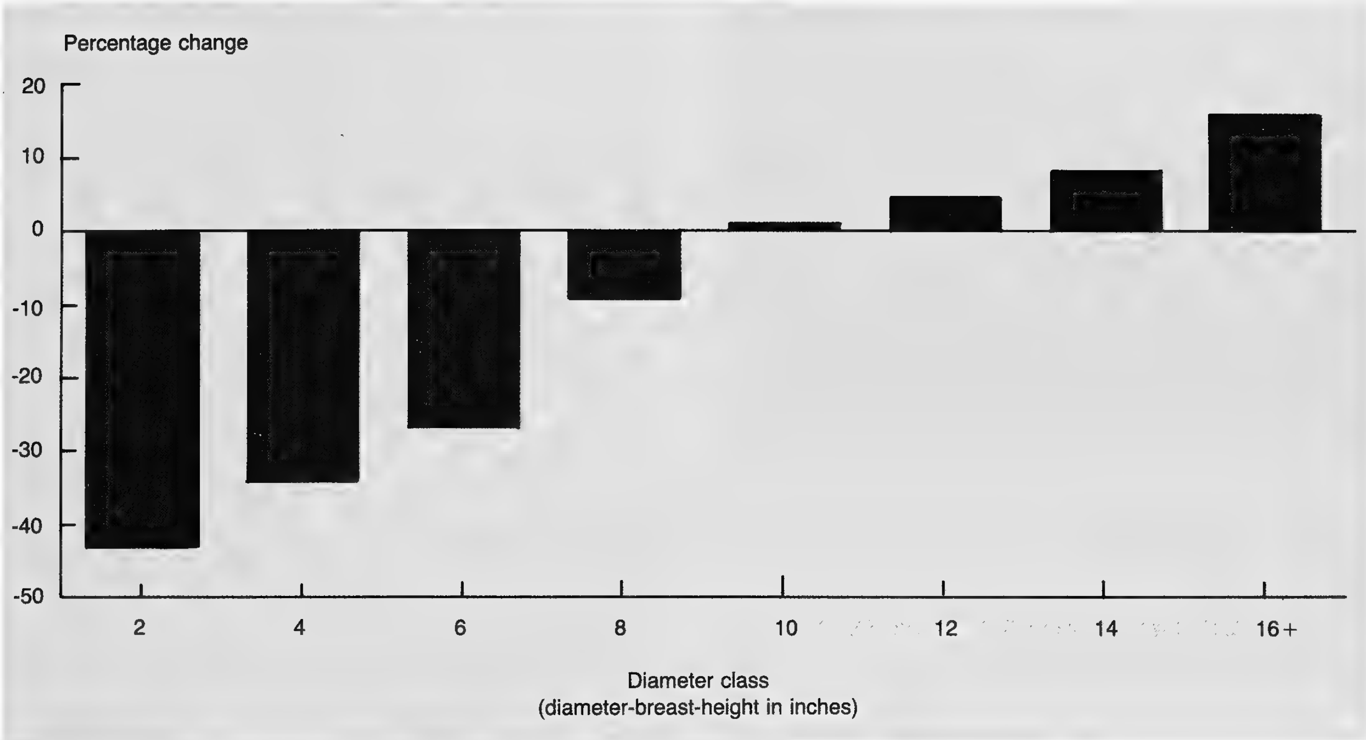


Figure 3.25—Percentage change in the number of live pine trees on other private timberland in the Southeast region between the most recent forest surveys, by diameter class

Table 3.17—Annual mortality of softwood growing stock on timberland in the South, by region and ownership, 1952–84

Million cubic feet

Region and ownership	Year 1952	1962	1970	1976	1984
Southeast					
Public	23	26	25	40	62
Forest industry	44	51	41	64	82
Other private[1]	168	183	193	312	394
Total	235	260	259	416	538
South Central					
Public	14	22	26	26	51
Forest industry	39	52	52	65	118
Other private[1]	44	64	88	121	246
Total	97	138	166	212	415
South					
Public	37	48	51	66	113
Forest industry	83	103	93	129	200
Other private[1]	212	247	281	433	640
Total	332	398	425	628	953

[1] Includes mortality on timberland leased to forest industry.

basal area per acre beyond what has been explained by changes in average stand density and age.

The causes of the decline in diameter and basal-area growth in the Southeast have not been determined. Changes in stand density and stand age, drought or other weather factors, the loss of fertility in old fields that came back to pine, an increase in hardwood competition, and atmospheric deposition are all possible contributing factors.

All of the factors affecting net annual growth are the result of forces that are not easily or quickly changed. The recent downturn in net annual growth of softwood in the Southeast is projected to continue until 1990, after which softwood growth will turn back up. By 1990, net annual growth of softwood in the Southeast is projected to be about 2.7 billion cubic feet, which means a further decrease of at least 8 percent below current levels. Beyond 1990, annual softwood growth is projected to climb back up to 3.5 billion cubic feet toward the end of the projection period.

Most of the further decline in softwood growth will be on other private land. In this broad ownership category, softwood growth is projected to decrease another 25 percent

A third factor causing the decline in net annual softwood growth is a rise in mortality—it roughly doubled in a 10-year period. Much of the increase in mortality is attributable to losses from pine bark beetles. Suppression is the second-leading cause of loss, followed closely by disease.

before it turns back up. On forest industry land, softwood growth continues to rise throughout the projection period and climbs to 1.6 billion cubic feet a year, more than 75 percent above current levels. Currently, forest industry land produces about 32 percent of the softwood growth. This proportion is projected to climb to about 47 percent in 2020.

By management type, pine plantations are projected to provide an increasing share of the softwood growth. In 1984, net annual growth of softwood on pine plantations totaled 0.9 billion cubic feet, about 30 percent of total softwood growth. Softwood growth on pine plantations is projected to increase to 2.5 billion cubic feet and eventually accounts for 72 percent of the total. Even by 2000, pine plantations will provide 64 percent of the softwood growth.

Trends in the South Central Region

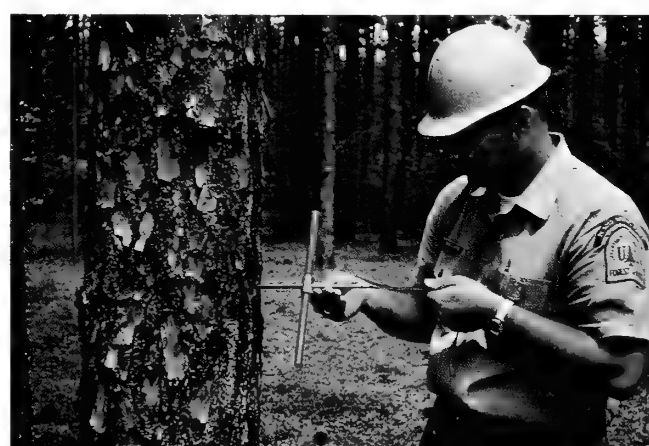
The most recent inventories in the South Central region have also shown declines in softwood net annual growth (app. tables 3.22 and 3.36). Net annual softwood growth rose steadily between 1952 and 1976 but appears to have peaked around 1980, according to the most recent data available. Increases prior to 1976 reflect strong ingrowth of softwood trees to merchantable size on large acreages of new pine forests naturally regenerated or planted on cutover timberland and idle cropland and pasture prior to 1962.

Almost all of the recent decline in softwood growth has occurred on other private timberland. Forest industry owners have steadily increased planting and the conversion of natural to planted pine, and this is reflected in increases in softwood growth. Softwood growth on public lands has fallen slightly, primarily because of withdrawals of timberland for wilderness or other uses that restrict timber harvesting.

These changes are reflected in the trends in softwood growth by management type. Softwood net annual growth on pine plantations increased by 26 percent between 1976 and 1984. In contrast, softwood net annual growth in natural pine and mixed pine–hardwood stands declined by 14 percent.

The drop in net annual softwood growth on other private timberland is caused by a number of factors. First, the area in pine has declined steadily since 1962. This is the result of timberland clearing for other uses, lack of pine regeneration after final harvest, and selective cutting that produces a net acreage shift to hardwood types.

Prior to 1962, the cropland area declined, and much of the idle land regenerated naturally or was planted to pine. As these young stands reached merchantable size, high rates of ingrowth contributed to increases in net annual growth.



The fourth factor causing the decline in net annual softwood growth is a reduction—20 to 30 percent over large areas in the South—in the annual rates of tree diameter growth. The causes of this reduction have not been determined. Changes in stand density and age, drought or other weather factors, the loss of residual fertilizer in old fields that came back to pine, and atmospheric deposition are all possible contributing factors.

Between 1962 and 1970, cropland area increased and the area in pine management types on other private owners dropped by an average 434,000 acres per year. This declined to 356,000 acres per year between 1970 and 1977 and has fallen further, to 309,000 acres per year since 1977. The reduction in pine type acreage since 1962 is now contributing to lower softwood ingrowth and declining net annual growth.

Since 1977, net pine type losses to landclearing have amounted to about 90,000 acres per year. Since clearing for cropland or pasture is roughly in balance with reversions of cropland to timberland, the net loss of pine type acreage is the result of urban and industrial expansion, new rights-of-way, new rural residences, and other relatively permanent timberland withdrawals.

Lack of adequate pine regeneration also contributes to losses in pine type acreage. Inadequate regeneration follows on about half of all other private timberland clearcuts in the South Central region, causing an annual loss of 150,000 acres of pine types. Partial harvests, almost always involving removal of merchantable softwood from a mixed stand, produce a net shift to hardwood type of 60,000 acres annually.

A second factor contributing to the reduction in pine growth is an increase in mortality. Based on recent surveys, softwood mortality has roughly doubled in the South Central region in the last 10 years (table 3.17). Pine bark beetles and disease, principally fusiform rust, account for two-thirds of the mortality loss. Weather, other insects, and suppression also account for a significant proportion of growth loss. Mortality now causes losses equal to 15 percent of gross growth, or an annual volume loss of 415 million cubic feet for all owners, including 246 million cubic feet for other private owners. Since 1976, net annual growth of softwoods on other private timberland has declined by 174 million cubic feet while annual mortality increased by 125 million cubic feet. Mortality has been responsible for more than 70 percent of the change in net softwood growth on other private timberland since 1976.

A third factor related to mortality is cull increment, an increase in the number of growing stock trees becoming rough or rotten and unusable for industrial wood products. Losses in cull trees used to be insignificant, but they now amount to roughly 16 percent of mortality. This is an additional loss of 65 million cubic feet annually for all owners. Causes of cull increment are similar to causes of mortality. Both mortality and cull increment are expected to increase further as the average age and stocking of South Central softwood stands increase.

A fourth contributing factor may be changes in stocking levels, which reflect management intensity. Recent surveys have highlighted an increase in both overstocked and understocked stands, neither of which is likely to grow at optimum rates. In Alabama, the area of understocked timberland (timberland less than 60 percent stocked with growing stock trees) increased from 2.7 million to 4.8 million acres between 1972 and 1982. Likewise, the area of overstocked timberland (timberland more than 130 percent stocked with growing stock trees) increased from 0.9 million to 1.4 million acres.

Although radial increment of softwoods in the South Central region has dropped, the decline does not appear to have significantly lowered volume growth. The average net annual softwood growth per acre on pine types in the South Central region has actually changed very little in recent years, rising from 53 cubic feet per acre in 1970 to 56 cubic feet per acre in 1976 and falling to 54 cubic feet per acre in 1984.

Net annual growth of softwood in the South Central region is projected to decline sharply through 1990 and then turn back up. In 1990, net annual growth of softwood is projected to total about 2.6 billion cubic feet, or 8 percent below present levels. Beyond 1990, annual growth of softwood climbs back up to 3.7 billion cubic feet in 2030.

Softwood growth on forest industry land continues to increase throughout the projection period, rising from 0.9 to 1.6 billion cubic feet. Between now and 1990, softwood growth on other private land falls from 1.6 to 1.2 billion cubic feet. It then climbs back to 1.6 billion cubic feet. Currently, forest industry land produces about 34 percent of the softwood growth in the South Central region, a proportion that is projected to climb to 45 percent by 2000.

Pine plantations are projected to provide an increasing share of the softwood growth. In 1984, net annual growth of softwood on pine plantations totaled 0.4 billion cubic feet, only 15 percent of the total. Compared to the Southeast, more of the plantations in the South Central region are in the sapling–seedling stage of development. Large areas of plantations will reach merchantable size by 2000, when the proportion of softwood growth attributed to this type is projected to account for 58 percent of the total. Softwood growth on pine plantations in the South Central region is projected to increase to 2.5 billion cubic feet and eventually account for two-thirds of the total.

Trends by State

Between 1952 and 1976, there were large increases in the net annual growth of softwood in every State in the South (figs. 3.23 and 3.24, app. tables 3.23–3.34 and 3.37–3.48). Toward the end of this period, the rate of increase slowed down and two States, Alabama and Tennessee, experienced some decrease in softwood growth. In terms of volume, the largest increases occurred in Georgia, South Carolina, Mississippi, Louisiana, Alabama, and Florida. Again, the establishment and development of pine stands on idle cropland and pasture in most States contributed greatly to the large increases.

Between 1976 and 1984, every State except Florida experienced a decrease in softwood growth. In Florida, pine plantations account for a larger share of the softwood resource than in the other States. The 1984 estimates of growth in Florida are also based on older inventory data than in most States.

So far, the largest measured declines in softwood growth in terms of volume at the State level have been in South Carolina and Alabama. Very large decreases have also been measured in the Piedmont and mountains of Georgia and North Carolina, but these decreases have been partially offset by increases in the Coastal Plain.

The net annual growth of softwood growing stock projected for 1990 is significantly lower than the net annual growth in 1984 in all but four States—Oklahoma, Florida, Virginia, and Alabama. Some of the largest declines are projected in Georgia, Mississippi, Louisiana, and North Carolina.

Net annual growth of softwood is increasing again in all States by 2000. In the base projections, the largest percentage increases above current levels are indicated for Oklahoma, Virginia, Alabama, Tennessee, and Louisiana. Of course, action taken between now and 2030 could certainly alter these prospective trends.

Southwide Summary of Softwood Growth Trends

In summary, the large increase in net annual softwood growth in the South between 1952 and 1976 reflects the high rate of pine establishment on idle cropland and pasture betwen 1945 and 1965 (Knight 1985). During this period, the establishment of pine on old fields, whether naturally occurring or accomplished through planting, tended to compensate for the failure of many other private owners to regenerate their pine stands following harvest.

After 1965, the rate of pine establishment on these other private lands dropped as this old-field source of pine regeneration dried up. Many of the other private landowners continued to accept whatever regeneration nature provided following the harvest of their stands. This practice resulted in more and more hardwood encroachment onto pine sites and a reduction in the acreage of young pine stands. This situation was furthered by the continuing loss of timberland to other uses.

Although forest industries have harvested and regenerated stands on lands they own or lease at a very rapid rate since 1965, the increased growth from their pine plantations has not fully compensated for the dropoff on other private lands. On many public holdings, there has been a general aging of the pine stands because of the long rotations practiced. As the average age of pine stands on these public lands has increased, there is some evidence of a slowdown in cubic growth also.

The current stand-age distribution of pine and mixed pine–hardwood stands in the South reflects the trends described (table 3.18). For example, about 45 percent of all pine and mixed pine–hardwood stands on other private lands are between 20 and 40 years old, compared to 30 percent 20 years and younger. Table 3.18 also shows the higher concentration of young stands on forest industry lands as well as the disproportionate share of older stands on public ownerships.

The large increase in net annual softwood growth in the South between 1952 and 1976 reflects the high rate of pine establishment on idle cropland and pasture between 1945 and 1965. Since 1965 the trends have reversed—timberland areas have been cleared, cropland and urban areas have increased.

Changes in numbers of all live softwood trees by diameter class between the most recent forest surveys in the South are consistent with the overall decline in young pine stands (fig. 3.26). The decline in softwood saplings identified in the 1970's has now progressed up through the 6-inch class (Boyce and Knight 1979). The declines in numbers of pine trees on other private land have progressed up through the 8-inch class. In a few areas, the decline in live softwood trees has already reached the 12-inch and larger classes.

In addition to the inadequate regeneration on other private land following harvest and an overall loss of timberland to other uses, a third factor affecting the slowdown in softwood growth in the South is a sharp increase in softwood mortality since about 1970. Since then, the annual mortality of softwood growing stock has more than doubled (table 3.17). Currently, about 15 percent of the gross annual growth of softwood is lost to mortality. This increase in mortality extends across the entire South and each of the major ownerships. Much of the increase in mortality can be attributed to periodic outbreaks of pine bark beetles over extensive areas in recent years. Forest survey statistics suggest insects account for 35 to 40 percent of the softwood mortality each year. Disease and suppression are the other leading causes of death: together, they account for another 35 to 40 percent.

Fusiform rust, littleleaf disease, and annosus root rot are the three leading diseases affecting pine in the South. Increases in mortality caused by suppression are attributed to significant buildups in average stand densities and some increase in average age in recent years.

Table 3.18—Distribution of pine and mixed pine–hardwood stands in the South, by age group and broad ownership class, 1985

Million acres

	Broad ownership class			
Stand age (years)	Public	Forest industry	Other private	Total all ownerships
0–10	0.9	6.4	6.1	13.4
11–20	1.3	6.9	9.6	17.8
21–30	2.0	6.6	12.9	21.4
31–40	1.7	4.1	10.2	15.9
41–50	1.3	2.0	6.2	9.5
50+	2.1	2.1	6.7	10.9
Total	9.3	28.1	51.7	89.1

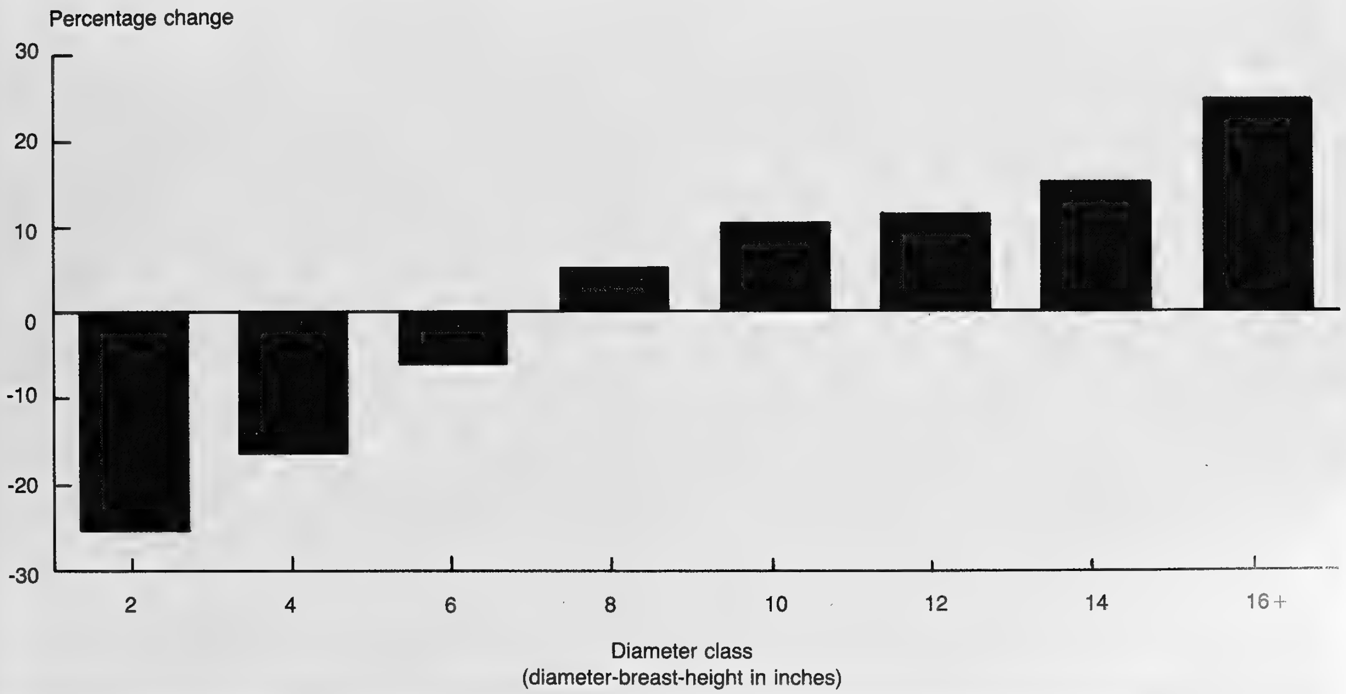


Figure 3.26—Percentage change in the number of live softwood trees on timberland in the South between the most recent forest surveys, by diameter class

Recent and Projected Softwood Growth–Removal Balances

As recently as 1976, net annual growth of softwood in the South exceeded annual removals by almost 30 percent. By 1984, this margin had been reduced to less than 10 percent because of the decline in growth and continuing increases in removals. By 1990, annual removals will exceed net annual growth of softwood by 8 percent. By 2000, growth and removals again approach a balance. Beyond 2000, growth exceeds removals by 5 to 8 percent.

Most of the deficit occurs on other private land, where by 1990, annual removals are projected to exceed the net annual growth of softwoods by about 24 percent. A small overcut on forest industry land is eliminated by 1990. Again, most of the deficit develops on natural stands, where removals exceed growth throughout the projection period. The projected trends in the softwood growth–removal balance follow the same general pattern in both the Southeast and South Central regions. In the South Central region, the growth deficit extends through 2000.

In the tables, the growth–removal relationships and changes in inventories sometime seem inconsistent. Most of these inconsistencies are caused by the treatment of timberland acquisitions and sales in the projection methods. For example, where an owner category is acquiring additional timberland, inventory can increase even though removals exceed growth.

Recent and Projected Softwood Inventories

Inventories of softwood growing stock include the solid wood (excludes bark) content, expressed in cubic feet, between a 1-foot stump and a 4-inch top diameter, outside bark, of all live softwood trees 9.0 inches d.b.h. and larger containing at least a 12-foot log, or two noncontiguous sawlogs, each 8 feet or longer meeting minimum grade requirements with at least one-third of the gross board-foot volume between a 1-foot stump and the minimum sawlog top (7.0 inches outside bark) being sound. In addition, inventories also include the solid wood content between a 1-foot stump and a 4-inch top diameter of all live softwood 5.0 inches to 9.0 inches d.b.h. that will prospectively qualify under the above standards. All of these softwood trees must occur on timberland.

Southwide Trends

Between 1952 and 1985, the inventory of softwood growing stock in the South increased from 58.2 billion to 101.8 billion cubic feet, or by 75 percent (table 3.15, fig. 3.27). Most of this buildup in inventory occurred in the 1960's and 1970's, when a rapid increase in softwood growth kept pace with the increase in softwood removals. In recent years, as growth turned down and removals continued to climb, the increase in softwood inventory has begun to level off.

Most of the large increase in softwood inventory between 1952 and 1985 occurred on other private timberland, where softwood inventories rose by more than 84 percent (table 3.15, fig. 3.27). This increase in softwood inventory on other private lands occurred in spite of a significant decline in pine acreage. It reflected the timber on millions of acres of young pine stands established between about 1945 and 1965.

Although forest industries acquired several million additional acres of timberland between 1952 and 1985, the increase in softwood inventory on industry lands, under 53 percent, was much less than the increase on other private lands. The rapid rate of harvest and conversion of natural stands to pine plantations tended to offset part of the buildup in inventory on industry land. Over the same period, a relatively slow rate of harvest on public lands enabled softwood inventories to increase 82 percent.

The base projections of net annual timber growth and removals indicate that the long upward trend in softwood inventories in the South has run its course. A 10-percent decrease is projected between now and 2000. Most all of this reduction occurs on other private timberlands, where

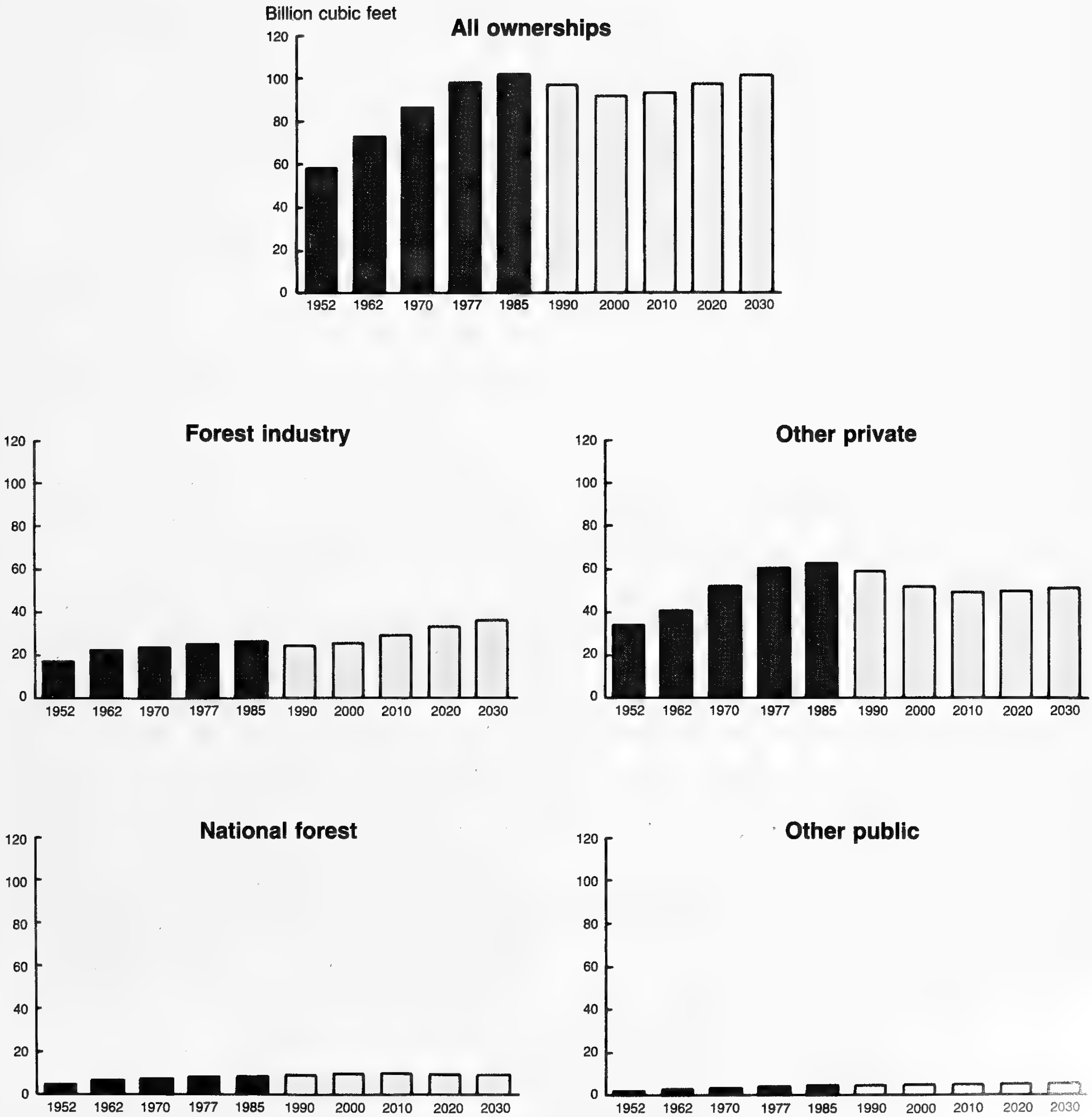


Figure 3.27—Softwood inventory in the South by forest ownership, 1952–85, with projections to 2030

softwood inventories are projected to decline by 21 percent between now and 2010. The base projections indicate the overall inventory of softwood will climb back to 101 billion cubic feet by 2030, a volume close to current levels. On other private land, the inventory is 51 billion cubic feet by 2030, 19 percent below current levels.

A 21-fold increase in the inventory of softwood in pine plantations has accounted for almost 30 percent of the buildup in softwood inventory since 1952 (fig. 3.28, table 3.16). Furthermore, the increase in softwood inventories in pine plantations continues. Since 1977, the inventory of softwood in natural pine, mixed pine–hardwood, and upland hardwood stands has either leveled off or started to decrease. The inventory of softwood continues to increase in bottomland hardwood stands, but a large share of this volume is cypress (fig. 3.28).

More and more of the inventory of softwood timber will be in pine plantations. Currently, pine plantations account for 13 percent of the softwood inventory; by 2000, this proportion will be between 30 and 35 percent; by the end of the projection period, this proportion exceeds 50 percent. Shortly after the turn of the century, the softwood inventory in pine plantations will exceed that in natural pine stands.

Small-diameter trees are characteristic of the southern softwood timber resource. Although there has been some recent movement toward the larger diameter trees in the volume distribution by tree size, well over 40 percent of the softwood inventory is still in 6-, 8-, and 10-inch trees (fig. 3.29). The 10-inch class accounts for the largest portion of the softwood volume, reflecting the fact that many pines in the region are cut for pulpwood by the time they reach this size.

As the softwood inventory shifts from natural pine to pine plantations, timber users will have to adjust to changing tree characteristics. For example, plantation-grown softwoods reach merchantable size at a younger age, and consequently a higher proportion of the wood in each tree has juvenile qualities. Shorter rotations may accentuate this shift.

One single species, loblolly pine, accounts for 47 percent of the softwood inventory in the region and is the species most widely used in intensive management (fig. 3.30). In terms of volume, shortleaf pine is the second-leading species but now accounts for less than 19 percent of the total. The volume of shortleaf pine has been declining rapidly over much of its range for a number of years. Slash pine is the only other species that accounts for more than 10 percent of the softwood inventory. Slash pine has been the leading species in plantations in parts of the southern Coastal Plain.

Trends in the Southeast

Since 1952, the inventory of softwood growing stock in the Southeast has increased from 33.8 billion to 50.5 billion cubic feet, or by almost 50 percent (app. tables 3.21 and 3.35). Most of this buildup in inventory occurred in the 1960's and 1970's, when net annual growth greatly exceeded annual removals. In recent years, the increase in the inventory of softwood growing stock has leveled off. Between 1977 and 1985, the increase was less than 4 percent when all ownerships are included. On other private land, softwood inventories declined slightly during this period.

In 1985, 65 percent of the softwood growing stock occurred on other private land, 23 percent was on land owned or leased by forest industry, and the remaining 12 percent on public timberland. On other private land, a large share of the softwood inventory is in pine and mixed pine–hardwood stands between 20 and 40 years old. In this ownership class, these age classes account for more than 40 percent of all the pine and mixed pine–hardwood stands. Because fewer than 30 percent of the pine and mixed pine–hardwood stands on other private land are 20 years and younger, a substantial decline in the inventory of softwood on this ownership is likely to occur if past harvesting trends continue.

The southern softwood timber resource is characterized by small-diameter trees. The 10-inch diameter class accounts for the largest portion of softwood volume, and well over 40 percent of the inventory is in that size class or smaller. Pulp mills, sawmills, and other wood-manufacturing industries are equipped to use small-diameter softwood timber efficiently.

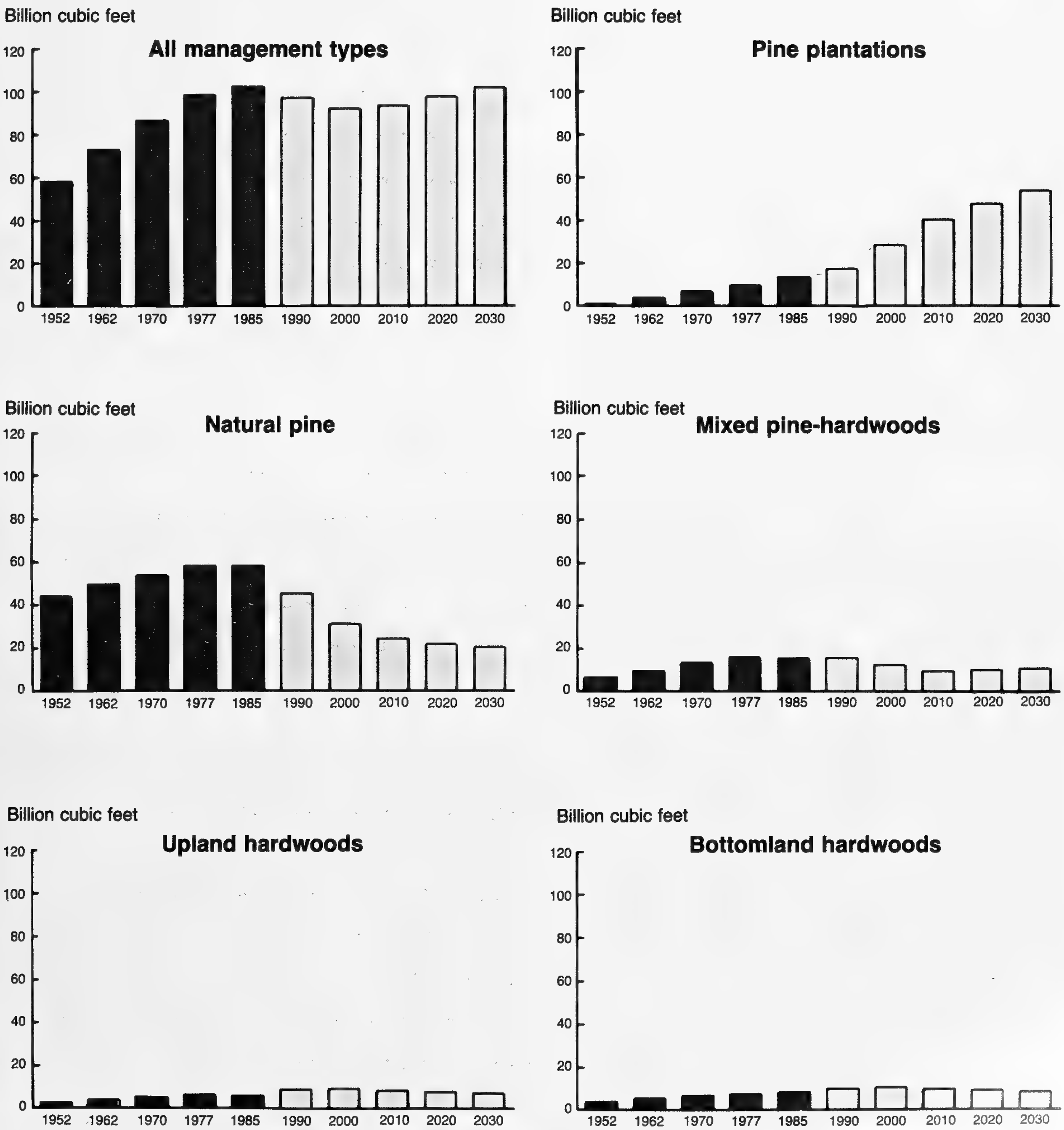


Figure 3.28—Softwood inventory in the South by forest management type, 1952–85, with projections to 2030

In contrast to the other private situation, about 60 percent of the pine and mixed pine–hardwood stands on industry land are 20 years and younger. Furthermore, most of these young stands are pine plantations. As these young pine plantations develop, a substantial increase in the inventory of softwood is expected on this ownership. Because many of these pine plantations are managed on rotations of 30 years or shorter, increases in inventory volume might not continue much beyond the projection period unless forest industry acquires additional acres.

Although public timberland accounts for only 12 percent of the softwood inventory, it accounts for a larger share of the bigger timber. More than 20 percent of all the pine and mixed pine–hardwood stands over 50 years old in the region are on public land. Furthermore, 30 percent of all pine and mixed pine–hardwood stands on public land are over 50 years old. Most of this public timber is on national forests and defense installations. Strictly from the biological standpoint, there are opportunities to increase the harvest of softwood from public lands; however, most of these lands are managed for multiple uses. If the accumulation of older stands on public land continues, some decline in growth and rate of inventory buildup can be expected.

By forest management type, 57 percent of the softwood growing stock is still in natural pine stands, but this proportion is dropping. Not only is the proportion of total softwood inventory in natural pine stands decreasing, the actual volume of softwood in these stands is also going down. Between 1977 and 1985, volume of softwood growing stock in natural pine stands declined 4 percent.

Currently, 16 percent of the softwood growing stock is in pine plantations, and this proportion will increase very rapidly with the development of several million acres of young plantations already established. Between 1977 and 1985, volume of softwood growing stock in pine plantations increased by 58 percent. These estimates of softwood volume in pine plantations exclude softwood volume in pine plantations classed as mixed pine–hardwood or hardwood type because of hardwood encroachment.

When all forest management types are combined, southern pines account for 88 percent of the total inventory of soft-

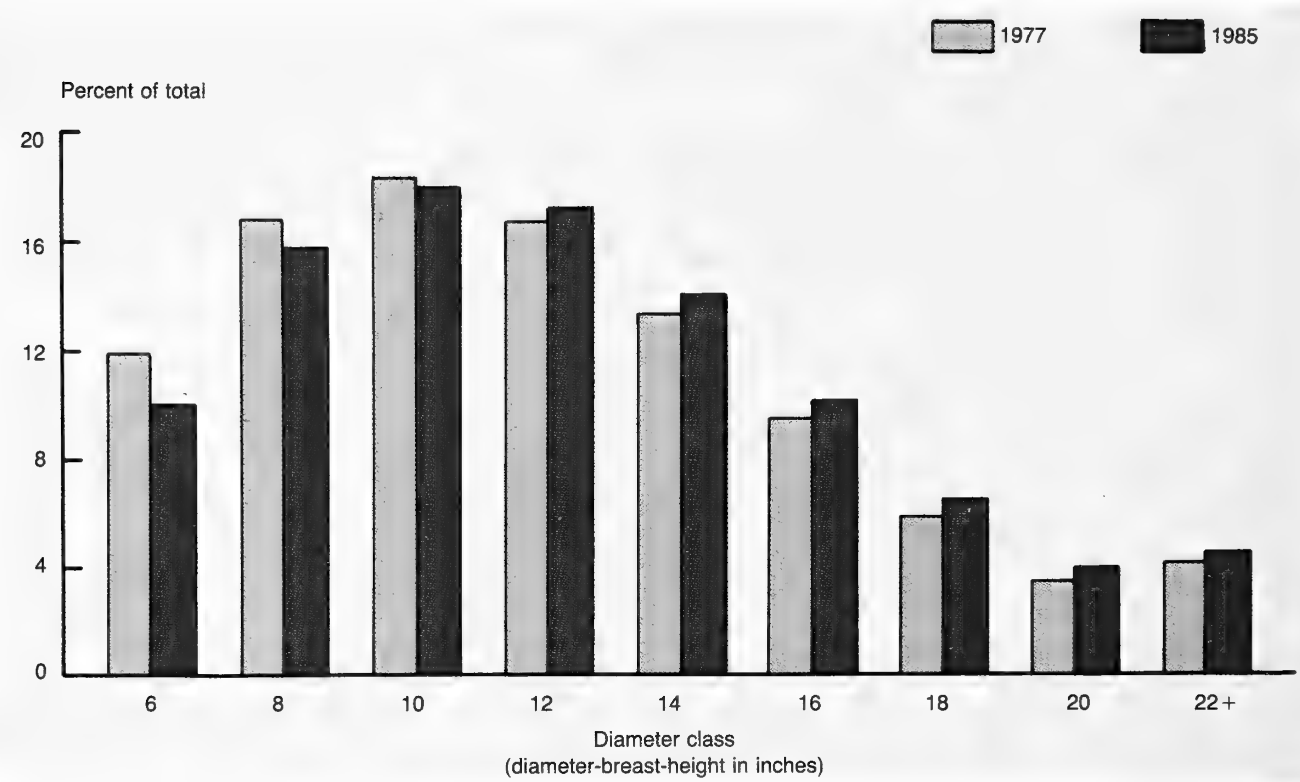


Figure 3.29—Percentage distribution of softwood growing stock on timberland in the South, by diameter class, 1977 and 1985

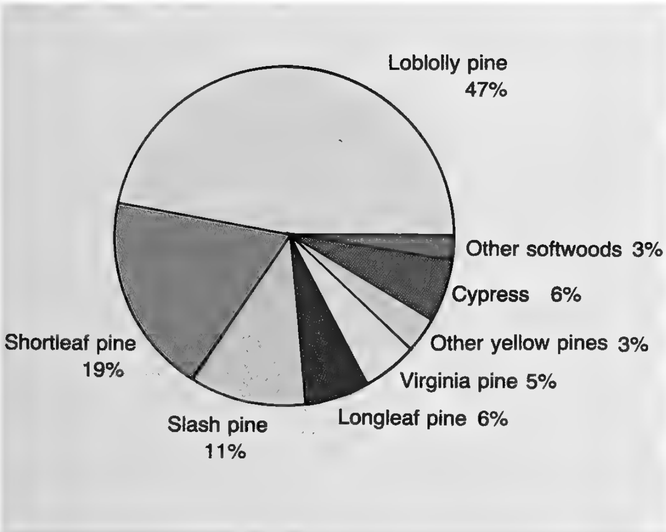


Figure 3.30—Percentage distribution of softwood growing stock on timberland in the South, by species, 1985

wood growing stock. Loblolly pine alone accounts for about 41 percent of the total softwood. Cypress accounts for about 8 percent of the softwood growing stock. Most of this cypress is in bottomland hardwood stands, where it makes up approximately 70 percent of the softwood volume. Currently, more than 30 percent of the softwood inventory in the Southeast is in Georgia (fig. 3.31).

Softwood inventories in the Southeast are near their peak and are projected to decline by 1990 as removals exceed net growth. When all ownerships are combined, the decline is rather modest and short lived. The softwood inventory falls from 50.5 billion to 45.9 billion cubic feet between 1985 and 2000 and then increases to 53.3 billion cubic feet by 2030. These overall trends, however, mask a significant reduction in softwood inventories on other private land.

On other private land, the inventory of softwood has already started to decline and is projected to drop to about 25.3 billion cubic feet by 2010, about 23 percent below the current level. A 33-percent increase in the inventory on forest industry land over this same period partially offsets this large reduction. Currently, the inventory on forest industry land comprises about 22 percent of the total. By 2010, this proportion approaches 32 percent.

Even greater changes are projected among the distributions of softwood inventory by management type. Currently, the inventory of softwood in pine plantations accounts for 16 percent of the total. This proportion is projected to increase to 34 percent by 2000 and to 54 percent by 2030.

Trends in the South Central Region

Softwood growing stock inventories rose rapidly from 1952 to 1977 in the South Central region (app. tables 3.22 and 3.36). Volume gains averaged 1.0 billion cubic feet per year. The situation has changed greatly since 1977, and although the 1985 estimate of 51.4 billion cubic feet is above the 1977 estimate, softwood inventories have probably peaked.

Inventory trends through 1977 were similar for all owners. Since 1977, softwood inventories have risen for all ownership groups except national forest, forest industry, and farmer (app. table 3.22). Declines in the national forests were due to reclassification of some forest land to productive-reserved status. On forest industry land, the declines are attributed to the rapid harvesting and conversion of natural stands to plantations. Softwood inventory declines on farmer-owned timberland have primarily resulted from land transfers to other ownership groups.

Softwood inventories for the natural forest types all show similar trends of rapidly increasing volume through 1977, and relatively little change between 1976 and 1984. Pine plantation softwoods have increased from insignificant in 1952 to about 11 percent of all softwood growing stock in 1985 (app. table 3.36). Currently, more than 20 percent of the softwood inventory in the South Central region is in Alabama (fig. 3.32).

Overall softwood inventory trends portray a maturing timber resource, the South's third forest (fig. 3.33). The average softwood volume per acre on softwood types has risen from 442 cubic feet in 1952 to 1,008 cubic feet in 1985. The big stocking increase occurred primarily on the 50 million acres of pine and mixed pine–hardwood present in the South Central region in 1962. Virtually all of this land had been heavily cut over.

Ten years ago the softwood inventory was increasing across all diameter classes. Recent surveys show growing stock volume declines in the 6-inch and 8-inch classes, and in some areas volume declines have reached the larger size classes. Volume declines will likely continue until recent increases in planting activity and management intensity compensate for declining numbers of small trees.

Prospective declines in softwood inventories in the South Central region are slightly greater than those projected for the Southeast. The overall decline also extends out to 2010. Between 1985 and 2010, the inventory of softwood in the South Central region decreases from 51.4 billion to 45.4

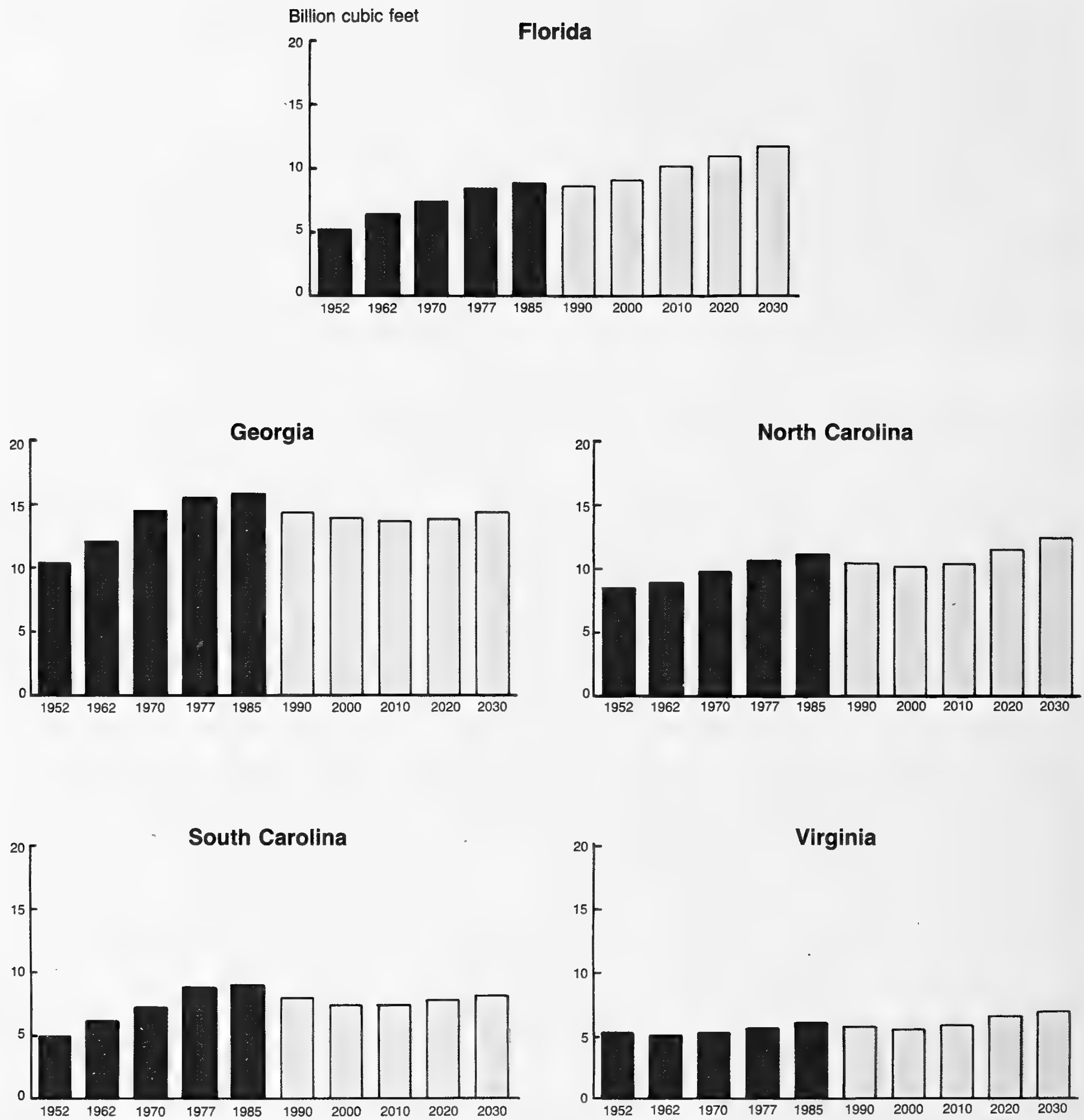


Figure 3.31—Softwood inventory in the Southeast region by State, 1952–85, with projections to 2030.

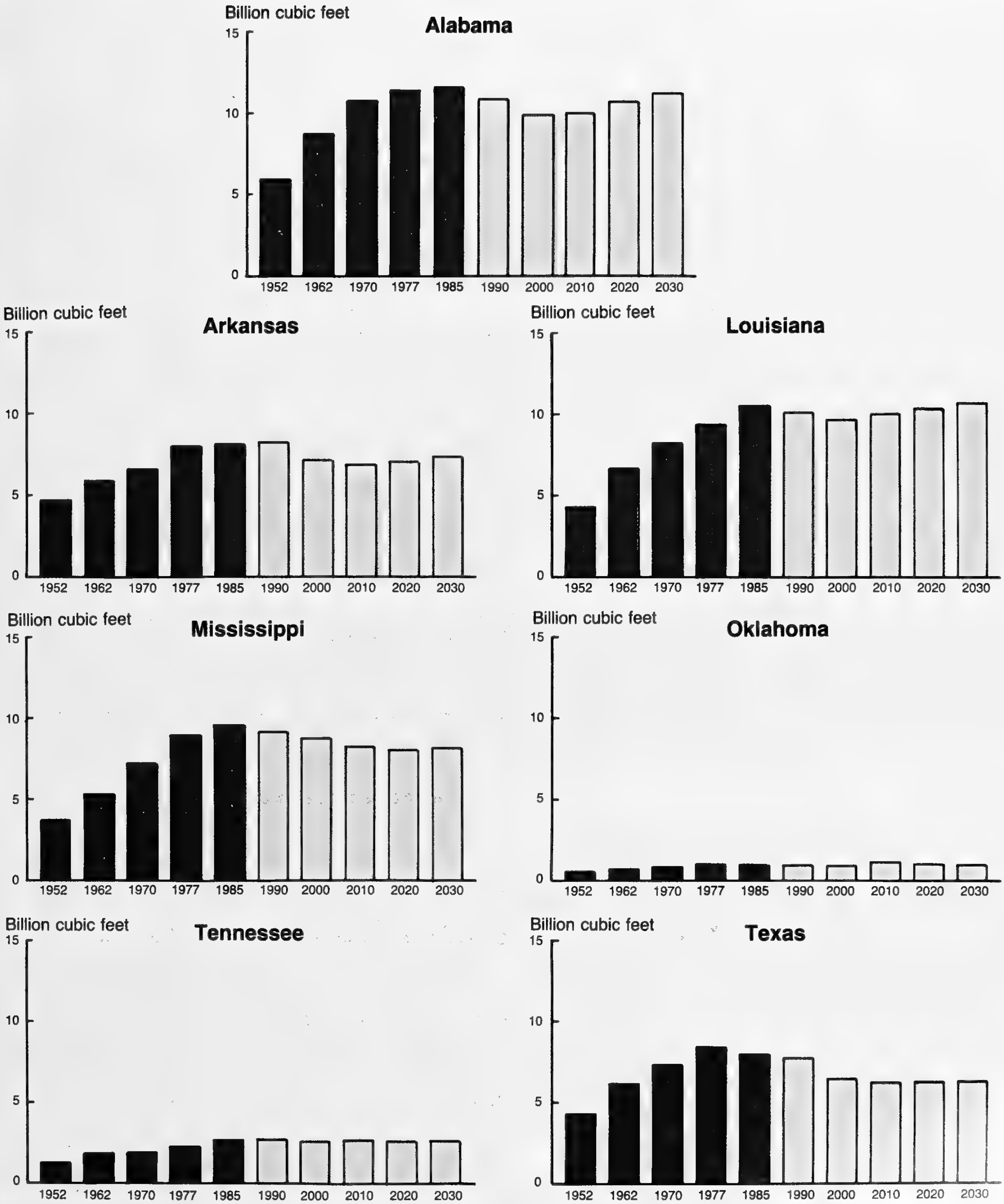


Figure 3.32—Softwood inventory in the South Central region by State, 1952–85, with projections to 2030

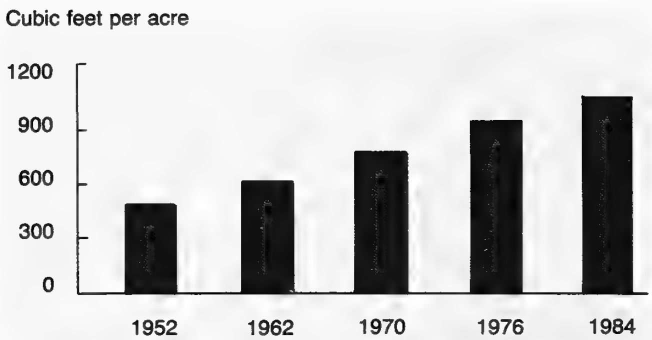


Figure 3.33—Average volume of softwood growing stock in pine and mixed pine–hardwood management types in the South Central region, 1952–85

billion cubic feet, or by 12 percent. The decline projected on other private land is about 20 percent, and it extends to 2020. Softwood inventory on forest industry land in the South Central region is projected to increase only 10 percent above current levels by 2030, which is well below the 69-percent increase projected in the Southeast.

A large, rapid increase in softwood inventory in pine plantations parallels the projected trends in the Southeast. Currently, the inventory of softwood in pine plantations accounts for 11 percent of the total. This proportion is projected to exceed 50 percent by 2030; it reaches 40 percent before 2010.

Trends by State

Between 1952 and 1985, every State except Virginia experienced a large increase in the inventory of softwood growing stock (figs. 3.31 and 3.32, app. tables 3.23–3.34 and 3.37–3.48). In Virginia, a tight growth–removal situation over much of the period held the increase down to about 15 percent, well below that of all other States. In terms of volume, the largest buildup in softwood inventory occurred in Louisiana, Mississippi, Alabama, and Georgia.

Between now and 2000, some decrease in softwood inventory is projected in every State. The largest declines are projected for Texas, South Carolina, Alabama, Georgia, and Arkansas. In Florida, Tennessee, and Oklahoma, the projected declines are very small. After 2000, softwood inventories are projected to increase again in most States, with the largest increases projected for Florida, North Carolina, Virginia, and Alabama.

Hardwood timber is an important resource in the South, both to the timber owners and forest industry. Currently, hardwoods account for about 33 percent of all timber supplies (harvests) from the South each year. In the years ahead, this proportion is expected to increase because of (1) large buildups in hardwood inventories, (2) changes in the use of hardwood timber, and (3) intensifying competition for softwood timber and softwood stumpage prices above those for hardwoods.

Southwide Trends

Between 1952 and 1976, the South supplied from 1.7 billion to 1.8 billion cubic feet of hardwood roundwood annually (tables 3.19 and 3.20, fig. 3.34). Since 1976, hardwood roundwood supplies have gone up 38 percent and currently total 2.5 billion cubic feet per year. Hardwood pulpwood, little used in 1952, has become the leading hardwood product and now accounts for about 40 percent of all hardwood roundwood supplies. Hardwood fuelwood production declined from 1952 to 1976, then doubled to cause a substantial proportion of the recent increase in total hardwood supplies. Hardwood fuelwood now accounts for 27 percent of all hardwood supplies.

Between 1952 and 1970, the proportion of hardwood supplied by various owners changed very little (fig. 3.34). Other private owners supplied 77 percent of hardwood roundwood, forest industry 18 percent, and public owners the remainder. Because of increasing fuelwood and hardwood pulpwood consumption, the situation changed between 1970 and 1984. Other private owners now supply about 72 percent of hardwood roundwood, forest industry 22 percent, and public owners 6 percent (table 3.19).

Hardwood supplies are projected to increase 68 percent by 2020, then decline slightly. By ownership, increases are projected to be largest for national forests, other individuals, and corporate owners. Hardwood roundwood supplies from the farmer ownerships will increase and then decline, concomitant with acreage declines. Appendix tables 3.49–3.62 show the historic trends in hardwood supplies by ownership, along with the projections, by region and State.

The proportion of hardwood supplies by management type has shifted over the years (table 3.20, fig. 3.35). In 1952, bottomland hardwoods supplied more hardwood roundwood than any other type, 46 percent of the total. Bottomland hardwood types still accounted for the most hardwood supplies in 1970, but the proportion fell to 40 percent. By

Hardwood timber is an important resource in the South: it accounts for a third of the timber harvested each year. Over half the region's timberland is classified as hardwood forest.

1984, bottomland hardwood types made up only 28 percent of all hardwood supplies. This reduction is consistent with the conversion of bottomland hardwood forests to cropland. Upland hardwoods, mixed pine–hardwoods, and natural pine types now supply much more hardwood roundwood than in the past. This trend corresponds with increased stocking in the upland hardwood type, strong fuelwood demand, and increased conversion of natural pine and mixed pine–hardwood to pine plantations.

Most of the projected increase in hardwood roundwood supplies comes from hardwood management types. Supplies from upland hardwoods will continue to dominate total hardwood supplies, rising to 2.1 billion cubic feet, about double current levels. Supplies from bottomland hardwoods will increase about 91 percent to 1.3 billion cubic feet. Hardwood supplies from natural pine stands will decline following acreage reductions in this management type. Appendix tables 3.63–3.76 show the historic trends in hardwood supplies by forest management type, along with the projections, by region and State.

Trends in the Southeast

Between 1952 and 1976, the Southeast supplied from 0.6 to 0.8 billion cubic feet of hardwood roundwood each year

(app. tables 3.49 and 3.63). Although the trend in total hardwood roundwood supplies was fairly flat during this period, there were substantial changes in output by product. During most of this period, the production of hardwood lumber, flooring, railroad ties and timbers, veneer, plywood, cooperage, and fuelwood trended downward. Large increases in the production of hardwood pulpwood and pallet stock just about offset those declines. Toward the end of this period, the production of hardwood fuelwood turned back up in response to large increases in the costs of mineral fuels.

Between 1976 and 1984, the annual harvest of hardwood roundwood from the region increased 48 percent, primarily because of a twofold increase in fuelwood production. Pulpwood and fuelwood surpassed sawlogs as the leading hardwood products in the region. In 1984, pulpwood accounted for approximately 34 percent of all hardwood roundwood supplies, followed by fuelwood (33 percent), sawlogs (29 percent), and veneer logs (3 percent). Other private lands provide 76 percent of the hardwood supplies, down from past years (app. table 3.49). Upland hardwood stands replaced bottomland hardwood stands as the leading source of supplies (app. table 3.63). North Carolina and Virginia were the leading State suppliers (fig. 3.36).

It seems clear that the Southeast is at the threshold of a major increase in demands on the hardwood timber resource.

Table 3.19—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in the South, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Ownership and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	33	41	44	44	52	134	157	162	181	189
Timber removals[2]	45	52	66	58	62	134	157	160	179	185
Net annual growth	135	165	224	251	255	230	204	189	183	180
Inventory[4]	3,951	5,341	5,997	7,108	8,425	8,760	9,673	10,083	10,300	10,308
Other public										
Roundwood supplies[1]	45	46	56	84	102	142	161	169	182	193
Timber removals[2]	62	58	79	106	121	142	159	167	179	190
Net annual growth	82	90	140	156	172	185	173	177	184	187
Inventory[4]	1,950	2,569	3,204	3,861	4,929	5,131	5,558	5,743	5,857	5,908
Forest industry[5]										
Roundwood supplies[1]	311	310	306	377	534	571	568	587	603	588
Timber removals[2]	414	422	413	472	605	569	564	580	594	577
Net annual growth	428	468	612	692	707	735	532	447	447	471
Inventory[4]	11,254	14,309	15,378	17,404	18,514	21,219	21,334	20,004	18,184	16,542
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	592	719	889	953	932	863	740
Timber removals[2]	([6])	([6])	([6])	750	818	894	951	924	852	727
Net annual growth	([6])	([6])	([6])	1,411	1,153	885	630	572	611	630
Inventory[4]	([6])	([6])	([6])	32,836	31,520	32,044	28,868	24,588	20,718	18,289
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	129	182	373	364	463	565	595
Timber removals[2]	([6])	([6])	([6])	160	203	373	363	459	557	585
Net annual growth	([6])	([6])	([6])	342	361	400	407	428	442	472
Inventory[4]	([6])	([6])	([6])	8,454	10,784	11,090	12,450	13,538	13,593	12,747

Table 3.19—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in the South, by ownership, selected years 1952–84, with projections[3] to 2030—Continued

Million cubic feet

	Year					Projections[3]				
Ownership and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	580	903	1,238	1,506	1,677	1,787	1,781
Timber removals[2]	([6])	([6])	([6])	716	1,006	1,238	1,499	1,662	1,763	1,750
Net annual growth	([6])	([6])	([6])	1,539	1,609	1,667	1,416	1,390	1,440	1,470
Inventory[4]	([6])	([6])	([6])	35,770	44,845	47,174	50,468	48,820	45,582	42,048
Total other private										
Roundwood supplies[1]	1,362	1,333	1,350	1,302	1,804	2,500	2,822	3,071	3,215	3,115
Timber removals[2]	1,834	1,809	1,783	1,626	2,028	2,505	2,813	3,045	3,172	3,061
Net annual growth	2,216	2,389	2,892	3,292	3,123	2,952	2,452	2,389	2,493	2,571
Inventory[4]	61,084	64,043	69,317	77,060	87,149	90,307	91,787	86,946	79,892	73,085
All ownerships										
Roundwood supplies[1]	1,751	1,730	1,756	1,807	2,493	3,346	3,708	3,988	4,181	4,084
Timber removals[2]	2,356	2,341	2,341	2,262	2,816	3,349	3,694	3,953	4,124	4,014
Net annual growth	2,861	3,112	3,868	4,391	4,257	4,102	3,361	3,202	3,307	3,409
Inventory[4]	78,239	86,262	93,896	105,433	119,018	125,418	128,354	122,774	114,232	105,844

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten tress; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.3). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.20—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in the South, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	1	4	10	15	36	68	105	129	136
Timber removals[2]	—	1	5	13	17	35	67	104	127	133
Net annual growth	8	19	27	32	40	74	107	129	146	147
Inventory[4]	256	387	405	502	670	686	1,155	1,479	1,691	1,854
Natural pine										
Roundwood supplies[1]	246	209	261	282	339	408	295	200	167	149
Timber removals[2]	325	304	354	353	392	410	293	199	165	147
Net annual growth	320	312	349	392	340	316	194	156	146	142
Inventory[4]	6,984	6,993	7,029	7,067	7,128	5,323	3,927	2,861	2,454	2,279
Mixed pine–hardwoods										
Roundwood supplies[1]	129	144	165	264	393	675	748	479	410	423
Timber removals[2]	180	177	215	322	443	675	742	474	406	416
Net annual growth	316	361	497	594	532	529	432	446	476	434
Inventory[4]	7,772	8,988	10,576	12,118	12,787	12,416	10,383	8,005	8,074	8,721
Upland hardwoods										
Roundwood supplies[1]	574	654	616	698	1,046	1,349	1,512	1,935	2,135	2,073
Timber removals[2]	784	887	823	904	1,185	1,350	1,509	1,920	2,107	2,037
Net annual growth	1,194	1,428	1,879	2,115	2,158	2,043	1,689	1,527	1,523	1,617
Inventory[4]	32,812	38,483	44,933	51,925	61,451	62,977	68,246	68,123	63,181	57,320
Bottomland hardwoods										
Roundwood supplies[1]	802	722	710	553	700	877	1,087	1,269	1,340	1,303
Timber removals[2]	1,067	972	944	670	779	879	1,082	1,257	1,320	1,281
Net annual growth	1,023	992	1,116	1,258	1,187	1,139	941	944	1,015	1,068
Inventory[4]	30,415	31,411	30,953	33,821	36,982	44,016	44,644	42,305	38,831	35,671
All management types										
Roundwood supplies[1]	1,751	1,730	1,756	1,807	2,493	3,346	3,708	3,988	4,181	4,084
Timber removals[2]	2,356	2,341	2,341	2,262	2,816	3,349	3,694	3,953	4,124	4,014
Net annual growth	2,861	3,112	3,868	4,391	4,257	4,102	3,361	3,202	3,307	3,409
Inventory[4]	78,239	86,262	93,896	105,433	119,018	125,418	128,354	122,774	114,232	105,844

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.3). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

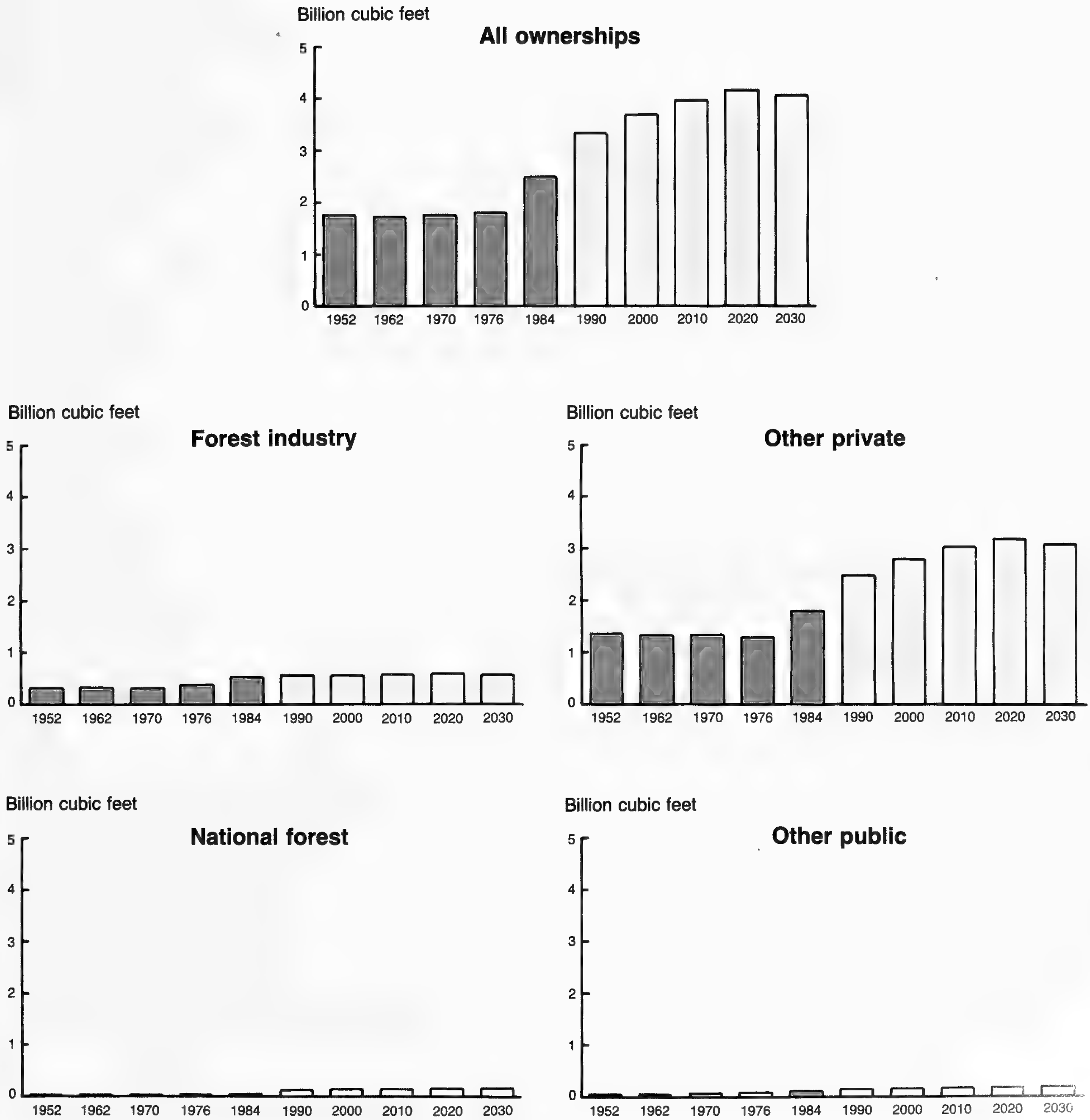


Figure 3.34—Hardwood roundwood supplies in the South by forest ownership, 1952–84, with projections to 2030

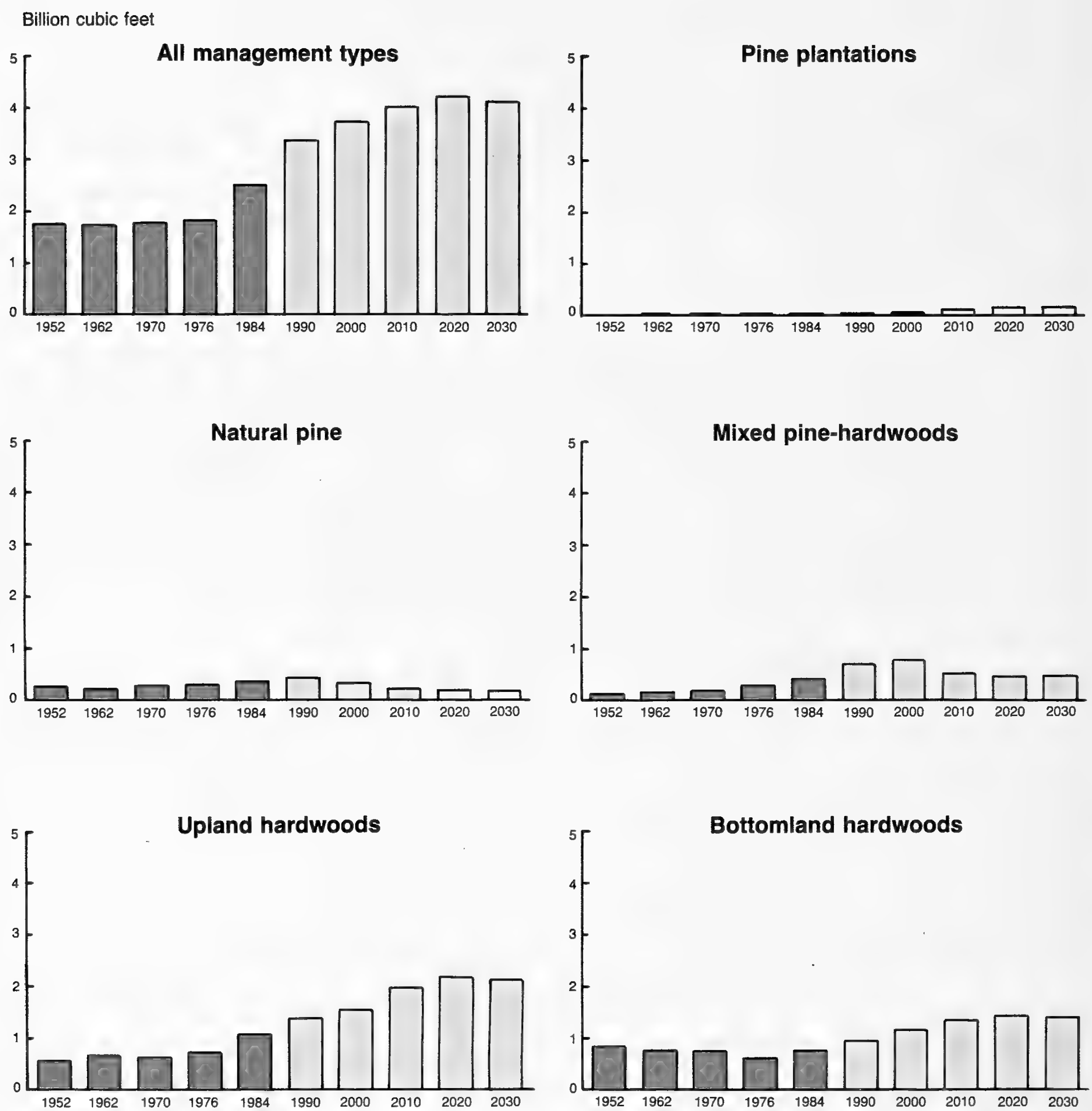


Figure 3.35—Hardwood roundwood supplies in the South by forest management type, 1952–84, with projections to 2030

Fuelwood—now one of the major uses of hardwood timber— comprises 27 percent of hardwood harvests, compared with 30 percent for sawlogs, and 39 percent for pulpwood.

Construction of several new oriented strand board plants in the region has been announced. In addition, there will be further substitution of hardwood for pine in pulping and some other products. The recent increase in fuelwood use also seems likely to continue. Between now and the year 2020, hardwood supplies are projected to increase to 1.9 billion cubic feet annually, 72 percent above current levels. Annual supplies are then projected to level off.

By ownership, most of the projected increase in hardwood supplies comes from other private and public lands. Very little increase is projected for forest industry land. Increases in hardwood supplies are projected for each hardwood management type. As the acreage in natural pine declines, hardwood supplies from this type decrease to about one-third of current levels by the end of the projection period.

Trends in the South Central Region

Total hardwood roundwood supplies in the South Central region were stable from the 1950's through the mid 1970's, then increased rapidly to 1984 (app. tables 3.50 and 3.64). The recent turnaround is due to large increases in hardwood pulpwood and fuelwood consumption. Hardwood pulpwood production rose from 900,000 cords in 1952 to 4.4 million cords in 1970, and then declined a bit before rising to the current level of 7.4 million cords. Hardwood fuelwood use declined through most of the period but then jumped from 187 million cubic feet to 308 million cubic feet between 1976 and 1984. Hardwood sawlog production has fluctuated moderately and is currently at about the same level as 1952, 2.5 billion board feet. Hardwood veneer production continues to decline.

In 1952, fuelwood comprised about half of all roundwood hardwood supplies. Most was cut from mixed pine–hardwood, upland hardwood, and bottomland hardwood types under private ownership. Production by State was generally determined by population level and forest area.

The major change that occurred by 1962 was a big increase in hardwood pulpwood consumption. This was offset by declines in the other hardwood products. The proportion supplied from each management type changed very little.

The 1970's saw further increases in hardwood pulpwood consumption and a reversal of the downward trend in sawlog production. Hardwood fuelwood use was at its lowest point in the 20th century. In 1976, fuelwood totaled 13 percent of hardwood production, sawlogs 40 percent, and hardwood pulpwood 42 percent.

In response to increases in the demand for hardwood fuelwood and hardwood pulpwood, harvests rose by 31 percent between 1976 and 1984. The largest proportion of this increase occurred on upland hardwood types owned by other private individuals. Fuelwood now comprises 23 percent of all hardwood production, sawlogs 32 percent, and pulpwood 44 percent.

Tennessee leads the South Central region in the use of hardwood fuelwood by a wide margin, followed by Mississippi, Alabama, and Arkansas. Hardwood fuelwood comprises a significant proportion of hardwood supplies in all South Central States. Traditionally about 30 percent of fuelwood supplies originate from sources other than growing stock, such as fencerows, wooded pastures not classified as timberland, and rough or rotten cull trees.

The increase in hardwood supplies projected for the South Central region is similar to that projected for the Southeast. A 64-percent rise is projected with most of this increase occurring between now and 2010. Most of the increase is on other private land, where hardwood supplies are projected to go up by 75 percent. Most of the additional timber comes from upland hardwood stands, where supplies are projected to more than double.

Trends by State

In 1952, Mississippi, Georgia, North Carolina, Arkansas, and Tennessee were the leading suppliers of hardwood roundwood. Collectively, they provided 58 percent of the region's total (figs. 3.36 and 3.37, app. tables 3.51–3.62

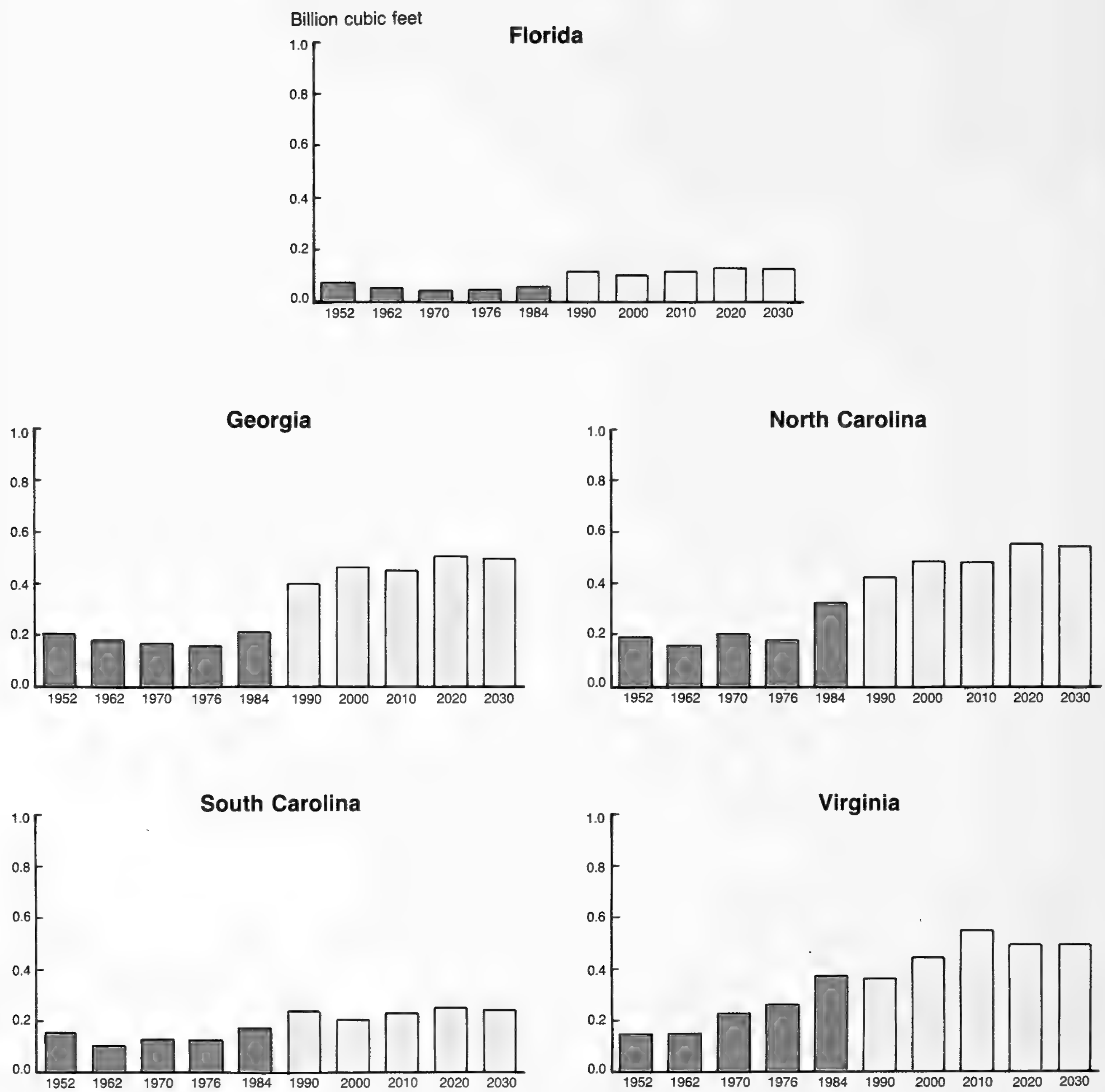


Figure 3.36—Hardwood roundwood supplies in the Southeast region by State, 1952–84, with projections to 2030

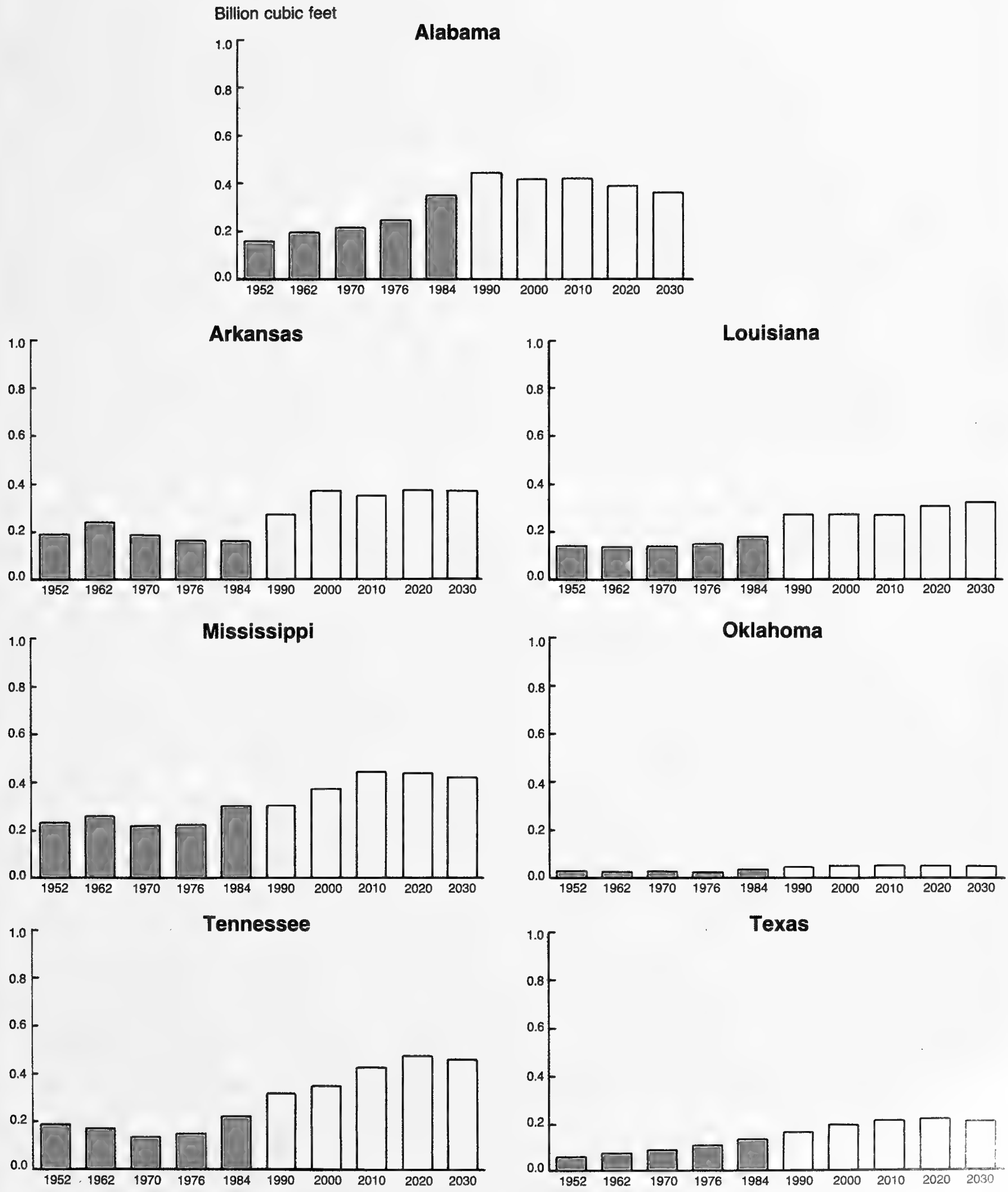


Figure 3.37—Hardwood roundwood supplies in the South Central region by State, 1952–84, with projections to 2030

and 3.65–3.76). Between 1952 and 1976, there were large increases in hardwood supplies from Virginia and Alabama, with a smaller increase from Texas. Hardwood supplies from most of the remaining States either declined or showed little increase.

Between 1976 and 1984, hardwood supplies increased in every State, except Arkansas. The largest increases occurred in North Carolina, Virginia, and Alabama. In 1984, Virginia, Alabama, North Carolina, Mississippi, and Tennessee were the leading suppliers, collectively providing 63 percent of the total.

By 2000, hardwood supplies are projected to be higher than in 1984 in each of the 12 States. In actual volume, the largest increases are projected for Georgia, Arkansas, and North Carolina. Very large percentage increases are projected in Florida and Oklahoma, but these are relatively minor hardwood States.

By 2030, five States—Virginia, North Carolina, Georgia, Mississippi, and Tennessee—are projected to supply 59 percent of the hardwood roundwood. The largest percentage increase is projected in Georgia; the smallest, in Alabama.

Although the output of roundwood products accounts for a smaller share of total annual removals of hardwoods than of softwoods, trends in hardwood removals still follow a pattern similar to that described for hardwood supplies. Currently, more than one-third of the annual removals of growing stock in the South is hardwood.

Southwide Trends

Hardwood timber removals from growing stock in the South stayed at about 2.3 billion cubic feet per year from 1952 to 1976 (tables 3.19 and 3.20, fig. 3.38). Increasing hardwood fuelwood and pulpwood consumption caused removals to go up by 24 percent between 1976 and 1984. Southwide, about 73 percent of all hardwood growing stock removals are used for roundwood products; the remainder is attributed to logging residue, cultural practices, landclearing, or other land-use changes. Currently, 53 percent of all hardwood growing stock removals occur in the South Central region and 47 percent in the Southeast.

Growing stock removals of hardwood by ownership show trends that are similar to hardwood roundwood supply trends. Ownership proportions changed very little between 1952 and 1970 (fig. 3.38). Since then, the proportion of hardwood removals from forest industry timberlands has increased. Currently 72 percent of hardwood removals come from other private timberland, 21 percent from forest industry timberland, and 7 percent from public timberland. These proportions are fairly consistent between the South Central and Southeast regions.

Hardwood removals are projected to increase about 46 percent over the next 35 years. This is largely the result of increasing consumption of hardwood fuelwood and pulpwood and continuing high rates of landclearing.

Hardwood removal projections are not uniform by ownership groups. Hardwood removals from other private timberland is expected to increase 56 percent, to 3.2 billion cubic feet. Most of the increase is on land owned by other individuals. In 2030, timber from these owners accounts for almost 44 percent of all hardwood growing stock removals.

In 1952, 45 percent of all hardwood removals came from bottomland hardwoods and 33 percent from upland hardwoods (fig. 3.39). Since then, hardwood removals from upland hardwood types have increased to 42 percent, and hardwood removals from bottomland hardwoods have declined to 28 percent of the total. These trends reflect slower clearing of bottomland hardwoods and higher

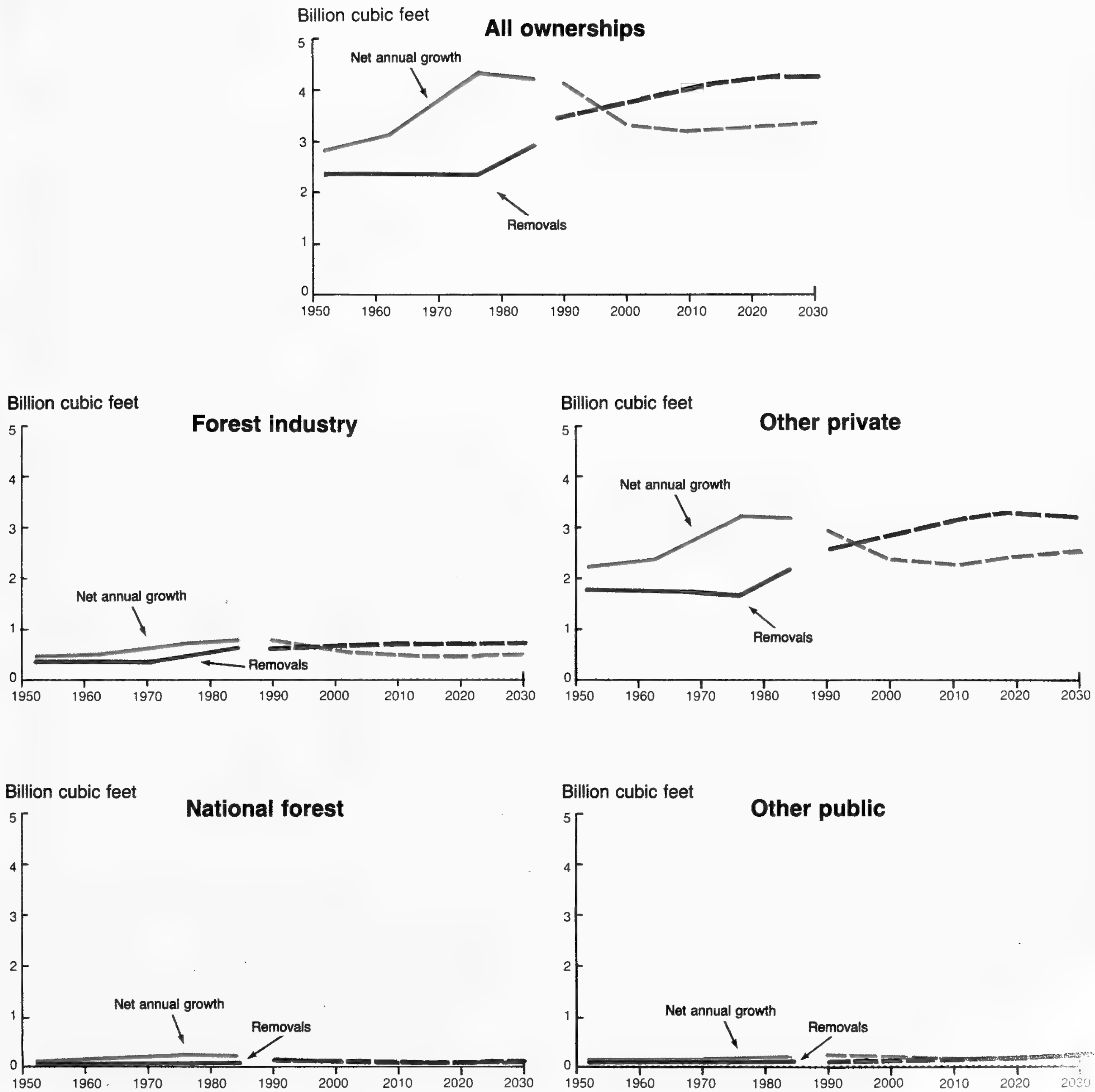


Figure 3.38—Hardwood net annual growth and timber removals in the South by forest ownership, 1952–84, with projections to 2030

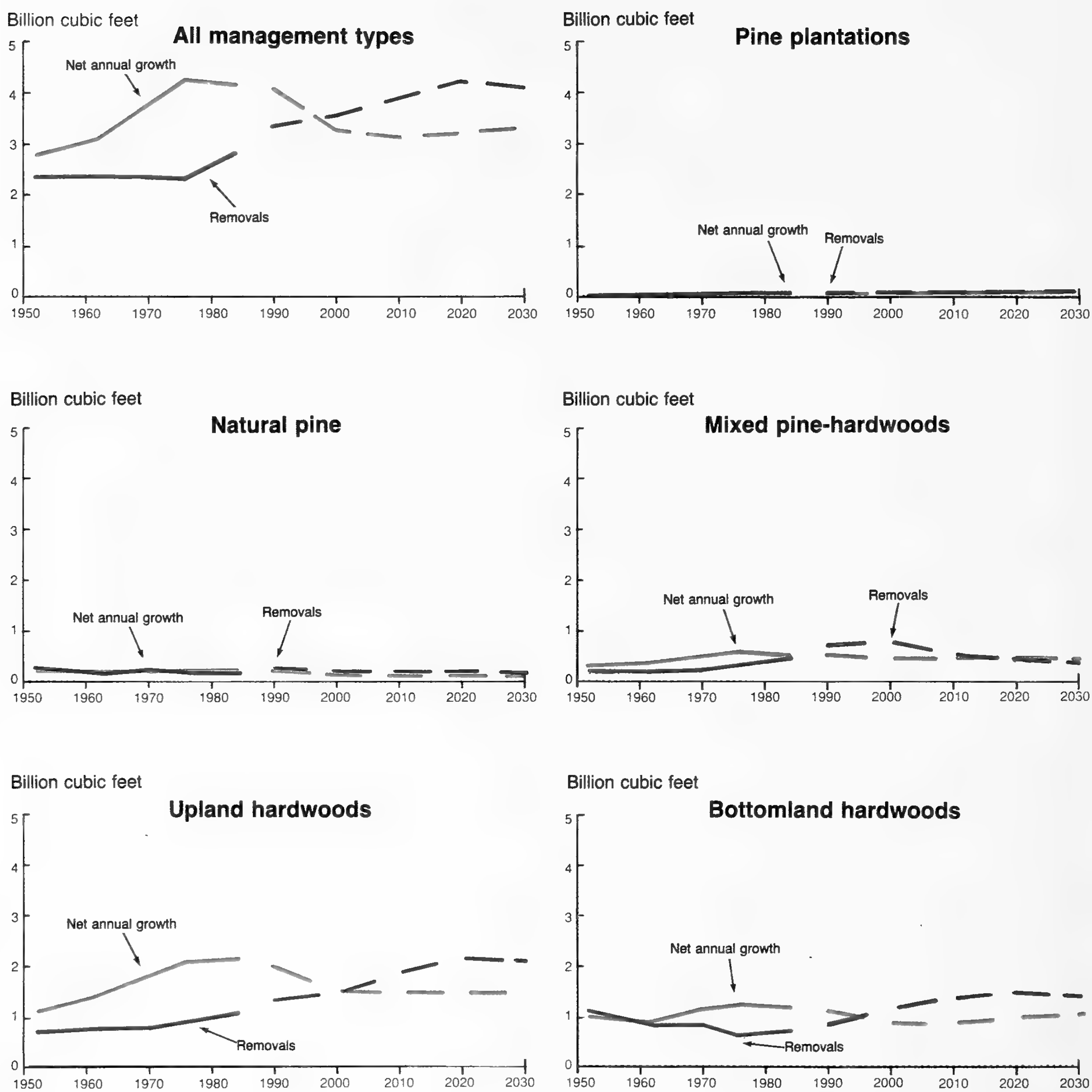


Figure 3.39—Hardwood net annual growth and timber removals in the South by forest management type, 1952–84, with projections to 2030

inventory volumes on upland hardwood timberland. Hardwood removals from natural pine types have remained relatively flat.

As with hardwood supplies, most of the projected increase in hardwood growing stock removals is expected to occur on hardwood types. Projected hardwood removals from upland hardwoods increase 78 percent and from bottomland hardwoods, 69 percent. Hardwood removals from pine types decline as the application of management practices that favor pines involves a larger proportion of the softwood resource.

The projected increases in hardwood removals coupled with projected declines in hardwood growth are expected to close the large gaps that now exist between hardwood growth and removals in both the Southeast and South Central regions. The base projections indicate hardwood removals will exceed hardwood growth in both regions by the year 2000 or shortly thereafter.

There are large volumes of hardwood timber in rough and rotten trees. While these trees are not suitable for sawlogs or veneer logs, they can be used for some products, including large-volume uses such as pulpwood and fuelwood.

Trends in the Southeast

As with softwoods, trends in the annual removals of hardwood growing stock in the Southeast follow a pattern similar to that described for hardwood roundwood supplies (app. tables 3.49 and 3.63). Based on the most recent forest surveys, timber products output accounts for about 66 percent of the annual removal of hardwood growing stock in the region. Logging residue accounts for another 14 percent, and other removals, the remaining 20 percent.

Expressed another way, timber products output from hardwood growing stock, as defined by forest survey merchantability standards, accounts for about 84 percent of hardwood roundwood supplies. The remaining 16 percent of hardwood roundwood supplies comes from utilization of timber from nongrowing-stock sources. Unlike the softwood resource, there are large volumes of hardwood timber in the Southeast in rough and rotten trees 5.0 inches and larger at breast height. Although these trees are not suitable for sawlogs or veneer logs, many of them can be used for fiber products such as pulpwood or for fuelwood. Currently, volume in these merchantable-size, rough and rotten hardwood trees totals about 8.8 billion cubic feet.

Between 1952 and 1976, the annual removals of hardwood growing stock in the Southeast averaged between 1.0 billion and 1.1 billion cubic feet. On the average, about 78 percent of these hardwood removals came from other private lands, 17 percent from forest industry holdings, and the remaining 5 percent from public timberland. At the beginning of this period, 50 percent of the hardwood removals came from bottomland hardwood stands. By the end of the period, less than 22 percent of the hardwood removals came from that source.

By 1984, annual removals of hardwood growing stock in the Southeast had climbed to 1.3 billion cubic feet. Based on the most recent forest surveys, 75 percent of these removals came from other private lands, 20 percent from forest industry holdings, and the remaining 6 percent from public timberland. About 60 percent of these removals came from upland hardwood or mixed pine–hardwood stands, 23 percent came from bottomland hardwood stands, and the remaining 17 percent came from the removal of hardwoods in pine stands. More hardwood removals occurred in Virginia than in any other State within the region (fig. 3.40).

Annual removals of hardwood growing stock in the Southeast are projected to increase 47 percent above current levels, with most of this increase occurring between now and 2010. By ownership and management type, the increases in hardwood removals follow the same trends described for hardwood supplies.

Trends in the South Central Region

Total hardwood removals followed the pattern of hardwood supplies and rose 20 percent between 1976 and 1984 (app. tables 3.50 and 3.64). Roughly 78 percent of hardwood

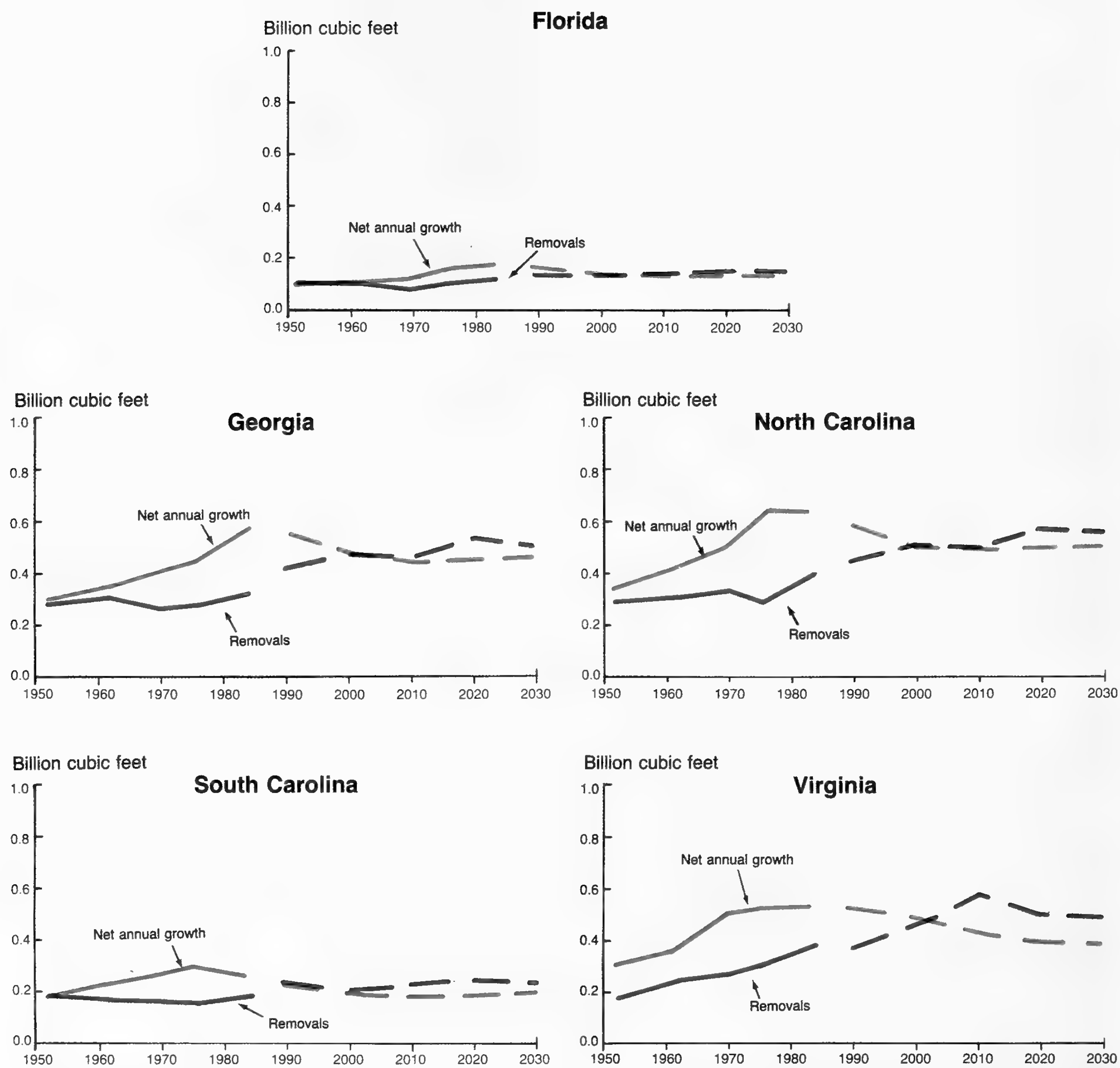


Figure 3.40—Hardwood net annual growth and timber removals in the Southeast region by State, 1952–84, with projections to 2030

removals was used for timber products, 13 percent was left as unused logging residue, and the remaining 9 percent was left unutilized after timberland clearing for nonforest use. These proportions have not changed significantly since 1952.

Removals from growing stock that are used for timber products account for 89 percent of all timber supplies. The remainder comes principally from nongrowing-stock sources such as rough and rotten cull trees, trees that are found on nonforest land, and portions of trees such as limbs that are not classified as growing stock by forest survey standards.

Hardwood removals on other private timberland showed the biggest gain among ownership groups, especially in Tennessee. Again, this reflects the increased consumption of hardwood fuelwood. Consistent with this trend is the big increase in hardwood removals from upland hardwood types. By 1976, hardwood removals from upland hardwood types exceeded hardwood removals from bottomland hardwood types. This is related to activity in Tennessee, which is covered primarily by upland hardwoods (fig. 3.41).

Annual removals of hardwood growing stock in the South Central region are projected to increase 46 percent above current levels. Most of this increase will occur between now and 2010. By ownership and management type, the increase in hardwood removals follows the same trends described for hardwood supplies.

Trends by State

Generally, the historic trends in hardwood removals by State parallel those described for hardwood supplies (figs. 3.40 and 3.41, app. tables 3.51–3.62 and 3.65–3.76). During the period from 1952 and 1984, there were sustained upward trends in hardwood removals in Virginia and Texas. In Arkansas, hardwood removals increased sharply between 1952 and 1970 but have since declined. The Tennessee trends are just opposite from those in Arkansas. In 1984, the largest amounts of hardwood removals were in Virginia, North Carolina, Alabama, Mississippi, and Georgia.

Because of assumed improvement in hardwood utilization, the percentage increase in hardwood removals is less in every State than the percentage increase projected in hardwood supplies. Otherwise, the prospective increase in removals by State is similar to the trends described for supplies. In terms of volume, the largest increases are projected in North Carolina, Tennessee, Georgia, Arkansas, and Louisiana. The smallest increase is projected in Alabama. Projected hardwood removals exceed projected softwood removals in only two States—Virginia and Tennessee.

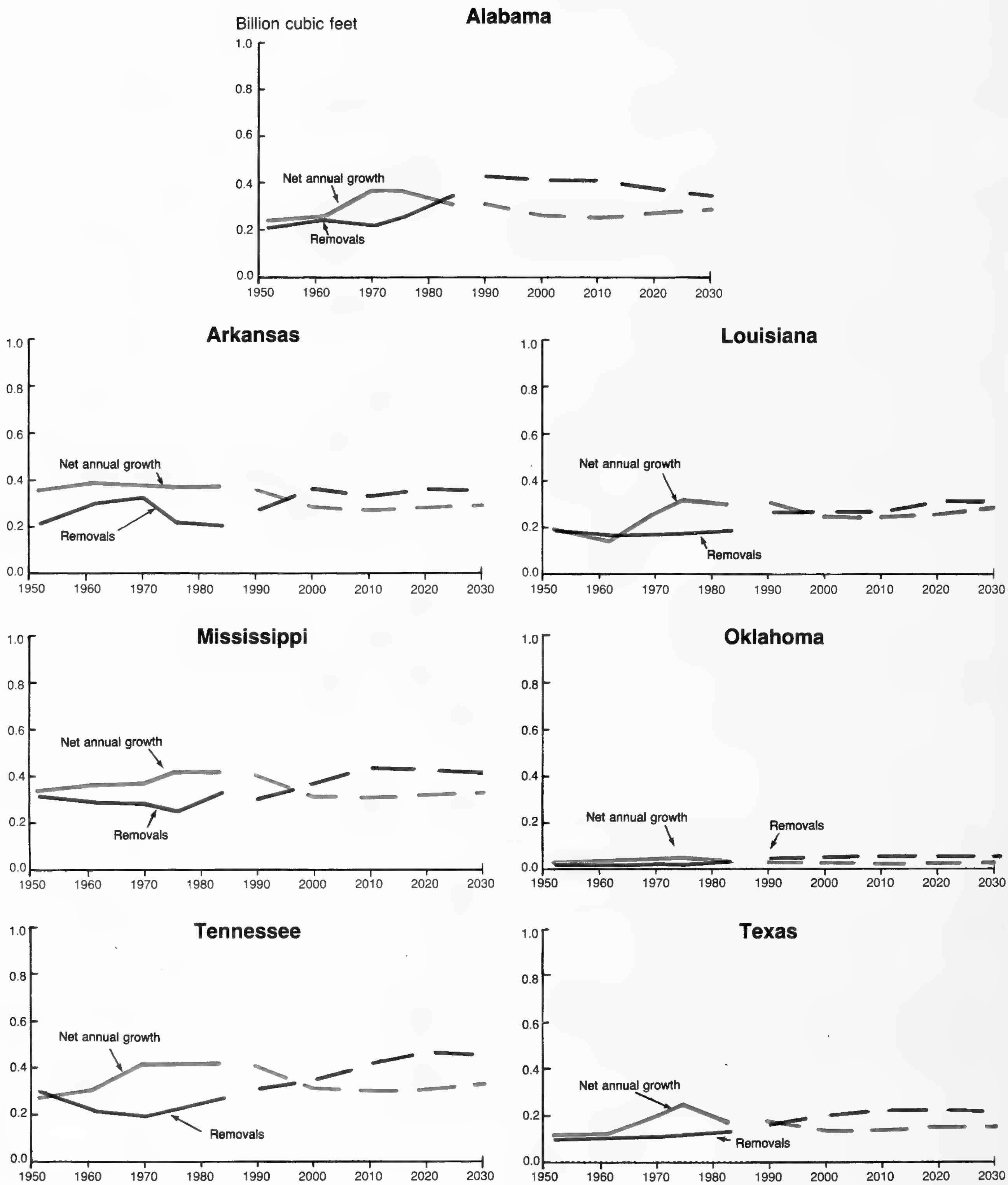


Figure 3.41—Hardwood net annual growth and timber removals in the South Central region by State, 1952–84, with projections to 2030

Recent and Projected Hardwood Net Annual Growth

Hardwoods account for well over 40 percent of the net annual growth of growing stock in the South. Generally, the rate of growth for hardwoods is slower than that for softwoods in the region, and hardwood stands are carried over longer rotations.

Southwide Trends

Between 1952 and 1976, net annual hardwood timber growth increased from 2.9 billion to 4.4 billion cubic feet, a rise of 53 percent (tables 3.19 and 3.20, fig. 3.38). Sometime after 1976, growth turned down, and in 1984 it was 3 percent below 1976. Hardwood net annual growth is projected to continue to drop through 2010 and then increase slightly. In 2030, net annual growth is 20 percent less than in 1984. By ownership class, the largest decline is projected on other private land (fig. 3.38). By management class, a larger decrease is projected for upland hardwoods than for bottomland hardwoods (fig. 3.39).

By ownership, net annual growth of hardwoods declined on farmer-owned timberland between 1976 and 1984 and rose for other ownerships. The farmer ownership and most other ownerships show declining trends over the projection period.

Hardwood growth on upland hardwood types has increased more than 80 percent since 1952 (fig. 3.39). This rate of increase is about five times greater than the increase on bottomland hardwood types. This difference results from interactions among a number of factors that have shaped the two broad management types. Bottomland hardwoods have been cleared more rapidly and maintained a higher average stocking than upland hardwoods. Upland hardwoods in the Atlantic and Gulf Coastal Plain regions are generally younger and less heavily stocked than bottomland hardwoods and contain a higher proportion of softwood, roughly 15 percent of the basal area. Upland hardwoods in the interior highland, mountain, and Piedmont regions are older and better stocked.

Several factors have been involved in the recent slowdown in hardwood growth. One of these, the gradual aging of the hardwood stands, has been brought about by the low rate of harvest, relative to the inventory. Another factor, also related to the aging of the hardwood stands, is a recent increase in mortality. Between 1976 and 1984, the annual mortality of hardwoods rose 40 percent (table 3.21). Stand conditions brought about by a long history of poor harvesting and regeneration practices have also adversely affected the growth of hardwood. Too often, the harvesting of hardwood stands in the region has consisted of high grading—removing the better trees and leaving a large residual of rough, rotten, and other poor-quality trees that impede the establishment and development of a new stand. Recent reductions in numbers of hardwood saplings are simply early indicators of the projected decline in hardwood growth (fig. 3.42).

Net annual hardwood growth is projected to decline in the South. This is the result of many of the same factors causing the reduction in net annual softwood growth—loss of hardwood acreage, higher mortality, and increasing stand age and stocking levels (where slower growth is to be expected).

Trends in the Southeast

Between 1952 and 1976, net annual growth of hardwood growing stock in the Southeast increased from 1.3 billion to 2.2 billion cubic feet, or by 69 percent. From 1976 to 1984, hardwood growth increased less than 1 percent.

Results from the most recent forest surveys in the Southeast suggest that the long upward trend in the net annual growth of hardwood has leveled off and in some places begun to decline (app. tables 3.49 and 3.63). A new survey in South Carolina showed a 28-percent decrease from the previous survey. Recently completed surveys in North Carolina and Virginia showed little change in the net annual growth of hardwood growing stock from the preceding surveys. When the change in hardwood growth in these two States is compared for all live timber rather than for growing stock, there was some decrease. This difference stems from the fact that more of the hardwood trees were classed as growing stock in the latest surveys. Without some significant increase in the rates of hardwood harvest and regeneration, a drop in net annual growth of hardwood is likely.

Table 3.21—Annual mortality of hardwood growing stock on timberland in the South, by region and ownership, 1952–84

Million cubic feet

Region and ownership	Year 1952	1962	1970	1976	1984
Southeast					
Public	25	29	32	38	50
Forest industry	44	41	37	40	49
Other private[1]	215	131	192	209	257
Total	284	301	261	287	356
South Central					
Public	19	30	26	29	44
Forest industry	50	82	55	61	94
Other private[1]	268	336	210	232	356
Total	337	448	291	322	494
South					
Public	44	59	58	67	94
Forest industry	94	123	92	101	143
Other private[1]	483	567	402	441	613
Total	621	749	552	609	850

[1] Includes mortality on timberland leased to forest industry.

While the net annual growth of hardwood has been exceeding annual removals and there has been a large buildup in hardwood inventories, there is also a growing accumulation of older hardwood stands in the region. Almost half of the hardwood stands in the Southeast are over 50 years old, and about 10 percent are over 80 years old. Many of these older hardwood stands are either in the rugged southern Appalachian Mountains or in swamps in the Coastal Plain. These adverse sites limit both the management and availability for harvest of these stands. Even in the Piedmont and on better sites, the absence of strong hardwood markets and low harvests have contributed to the buildup of older stands. Many of these older stands show evidence of periodic high-grading in the past.

Many of the young hardwood stands in the region have developed from hardwood encroachment on upland sites following the harvesting of pine. Some of these upland sites are not well suited for growing quality hardwood saw-timber. A further accumulation of older hardwood stands will likely cause an increase in mortality and a decrease in growth.

In 1984, about 76 percent of the 2.2 billion cubic feet of hardwood growth in the Southeast occurred on other private

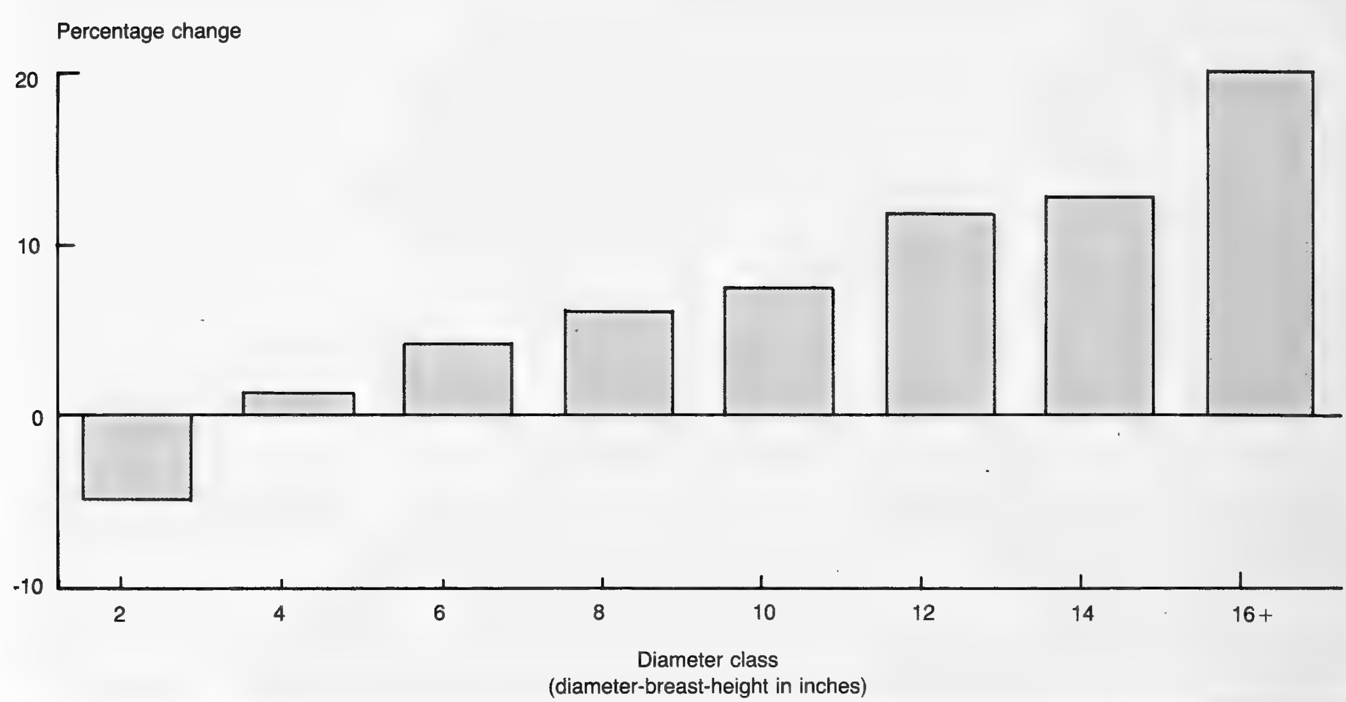


Figure 3.42—Percentage change in the number of live hardwood trees on timberland in the South between the most recent forest surveys, by diameter class

land. By forest management type, 64 percent occurred in upland hardwood and mixed pine–hardwood stands.

Collectively, oaks account for almost 40 percent of the hardwood growth in the region and gums, 20 percent. Yellow-poplar, a major species throughout most of the region, accounts for 16 percent of the hardwood growth.

Net annual growth of hardwood growing stock in the Southeast is projected to decrease from 2.2 billion to 1.7 billion cubic feet, or by 25 percent, between now and 2010. Hardwood growth is then projected to turn back up slightly, toward the end of the projection period. Declines take place in every ownership class except corporate and other private. No significant change is projected in the proportion of hardwood growth between the major hardwood types.

Trends in the South Central Region

The most recent forest surveys in the South Central region have shown a significant decline in hardwood net annual growth. Hardwood growth rose steadily from 1952 to 1976 and appears to have reached a peak between 1976 and 1984 (app. tables 3.50 and 3.64). Hardwood ingrowth on cutover timberland and cropland and pasture reversions were strong up to the mid 1970's, and with removals relatively low, the growing stock inventory increased.

Between 1976 and 1984, net annual growth of hardwood declined 9 percent on other private timberland. Forest industry timberland showed a decrease of 3 percent, and public timberland an increase of 3 percent.

Hardwood growth is declining the most on bottomland hardwood types. Hardwood growth on upland hardwood types is still slowly increasing. This increase accompanies a continual shifting of land to the upland hardwood type from two sources: cropland and pasture reversions, and cutover pine types that are not regenerated to pine.

Currently, about 41 percent of an average of 540,000 acres of cropland and pasture reverting each year to timberland are classified hardwood during the first 10 years. Some of the upland hardwood acreage shifts to oak–pine, natural pine, or pine plantations by about age 15. The other major source of new hardwood-type acreage, cutover pine lands, provides an additional 560,000 acres per year, for a total influx of 780,000 acres of new hardwood stands annually.

Increased hardwood mortality has also contributed to the downturn in hardwood growth. Based on recent surveys, hardwood mortality increased by 53 percent between 1976 and 1984. In addition to mortality, damage from disease, weather, and other destructive forces has caused an increase in the number of growing stock trees becoming rough or rotten culls. Cull increment causes a loss of 140 million cubic feet annually. Losses to mortality and cull increment combined total 634 million cubic feet annually, nearly double the loss rate in 1976.

The recent drop in net annual growth of hardwood growing stock in the South Central region is projected to continue with a decline of 25 percent by 2010, when the net annual growth of hardwood is 1.5 billion cubic feet. A modest upturn is then projected back to 1.7 billion cubic feet by 2030. Declines are projected in every ownership class except corporate. A small decrease, from 47 to 42 percent, is projected in the proportion of hardwood growth in the upland hardwood type.

Trends by State

Between 1952 and 1976, the general increase in net annual growth of hardwood was evident in every State except Arkansas, where the trend has been relatively flat (figs. 3.40 and 3.41, app. tables 3.51–3.62 and 3.65–3.76). In terms of volume, the largest increases in hardwood growth occurred in Virginia and North Carolina. Since 1976, there have been measured declines in hardwood growth in most States.

The projected decrease in net annual growth of hardwoods between 1984 and 2010 occurs in each of the 12 States. In terms of volume, the largest decreases are projected in North Carolina, Virginia, Georgia, Mississippi, Tennessee, and Arkansas—all important hardwood States.

Between 2010 and 2030, net annual growth of hardwood is projected to increase again in each of the 12 States. In terms of volume, the largest increases are projected in North Carolina, Georgia, Virginia, and South Carolina.

Recent and Projected Hardwood Growth–Removal Balances

In contrast to the small margin of softwood growth over removals in 1984, the net annual growth of hardwood exceeded annual removals of hardwood in the South by 51 percent. With the expected increases in hardwood demand and the decreases projected in hardwood growth, this gap will close very rapidly, and by 2000, hardwood removals are projected to exceed hardwood growth by almost 10 percent. The deficit reaches almost 25 percent in 2020 before the gap again begins to close.

Most of the projected deficit in hardwood growth is on private land. Currently, the net annual growth of hardwood on public lands is more than double the removals. A small margin of growth over removals is maintained on these public lands until the end of the projection period. By management type, the hardwood growth deficit first shows up in the pine and mixed pine–hardwood types. Next, it shows up in the bottomland hardwood type. A hardwood growth deficit does not develop in the upland hardwood type until 2010.

Currently, the margin of hardwood growth over removals is much smaller in the South Central region than in the Southeast. The hardwood growth deficit also develops sooner in the South Central region than in the Southeast.

Recent and Projected Hardwood Inventories

Although many people perceive the South as primarily a softwood timber region, the inventory of hardwood growing stock exceeds the inventory of softwood growing stock by 17 percent. Because of a large quantity of hardwood in trees that fail to qualify as growing stock because of species, poor form, or excessive rot, the difference is even larger when the volumes in all live trees are compared. In all live timber, volume of hardwood exceeds volume of softwood by more than 30 percent.

The merchantability standards for hardwood growing stock are the same as those described earlier for softwood, except for the minimum diameters for sawtimber. For hardwood sawtimber trees, the minimum diameter at breast height is 11.0 inches, and the minimum sawlog top is 9.0 inches outside bark.

Southwide Trends

The inventory of hardwood growing stock rose by 52 percent between 1952 and 1985 (tables 3.19 and 3.20, fig. 3.43). The rate of increase was faster in the Southeast than the South Central region. The steady increase resulted from a large excess of growth over removals that has been sustained throughout the period. In 1984, the ratio of hardwood growth to removals was 1.51.

The projected inventory of hardwood growing stock increases to 128 billion cubic feet in 2000, then declines to 106 billion cubic feet in 2030. The decrease is projected to be much larger in the South Central region than in the Southeast. This reflects significantly higher removals and slower net annual growth.

Other private owners control 73 percent of the hardwood resource. Since 1952, growing stock volume of hardwoods on this ownership class has increased by 43 percent, compared with 65 percent for forest industry lands and 126 percent for publicly owned land (fig. 3.43). Only part of the difference can be explained by acreage trends, which have been upward for public and forest industry owners and downward for other private owners. Timber harvesting has also been influential, along with the origin of many upland hardwood stands in other private ownership. Many of these stands originated on cutover pine sites and contain high stocking of rough or rotten cull trees that do not contribute to growing stock.

In the projections by ownership, hardwood inventories on lands owned by forest industry and other individuals increase through 2000 and then decline. Hardwood growing stock volume on public timberland rises throughout the

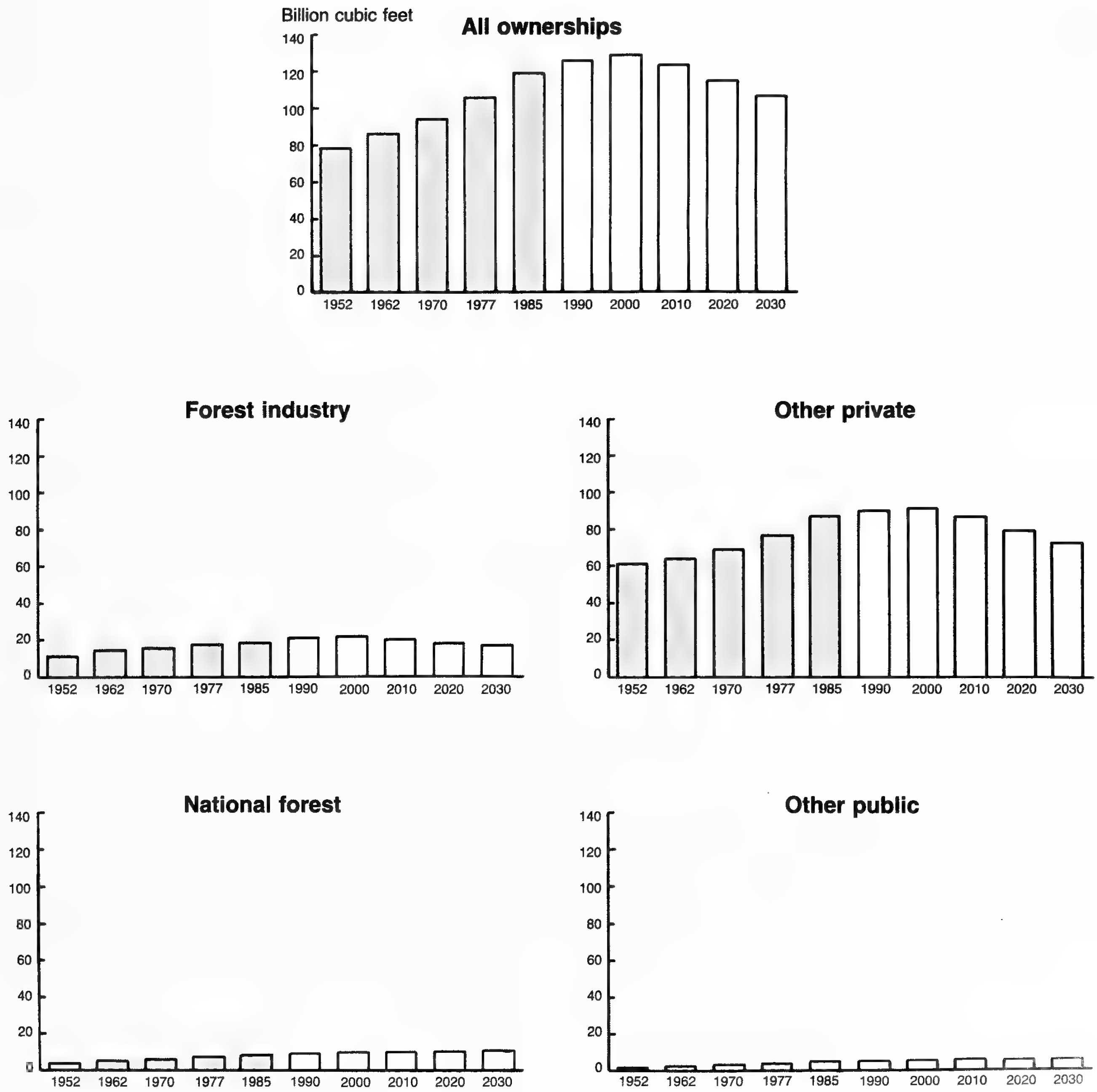


Figure 3.43—Hardwood inventory in the South by forest ownership, 1952–85, with projections to 2030

projection period. The hardwood inventory on corporate ownerships does not decline until after 2020. The farmer-owned hardwood inventory declines from 1990 onward.

Since 1952, hardwood growing stock volume has nearly doubled for the upland hardwood type, and increased by 22 percent for bottomland hardwoods (fig. 3.44). Hardwood volume has also increased for the mixed pine–hardwood and pine types.

Projections by management type show hardwood volume peaking near 2000 for both upland and bottomland hardwood types, then declining to levels somewhat below those in 1984. The hardwood volume in natural pine stands declines through the period, while in plantations, hardwood volume increases. In mixed pine–hardwood stands, hardwood inventory declines until 2010 and then increases slightly. Some of these differences correspond with acreage trends. Since pine plantations carry much less hardwood volume, on the average, than natural pine stands, an increase in this type would not have much effect on the overall hardwood inventory.

There are important regional and local differences in the hardwood timber resource. Factors that vary with locality and management type include stand history, site quality, and cull-tree stocking. Species composition, timber quality and dimensions, and site factors that may limit timber availability are also quite variable across the South. Thus, despite an overall favorable growth-to-removals balance, the hardwood inventory situation may be critical for some users of high-quality timber of preferred species and adequate for others who use small, lower quality trees.

In general, more of the hardwood inventory is in large trees when compared to the softwood inventory. For example, more than 35 percent of the volume of hardwood growing stock in the South is in trees 15.0 inches and larger in diameter at breast height. Only 25 percent of the softwood inventory is in these larger trees. With the aging of the hardwood stands, there is also a trend toward larger trees in the inventory (fig. 3.45).

In contrast to the softwood inventory volume, where a single species, loblolly pine, accounts for almost half the volume, the inventory of hardwood is more evenly distributed among a number of species (fig. 3.46). Collectively, the oaks account for about 43 percent of the hardwood inventory, and gums account for another 22 percent.

Trends in the Southeast

Although nearly all of the intensive timber management in the Southeast has been targeted toward growing more softwood, the increase in hardwood inventories has exceeded that of softwood. Since 1952, the inventory of hardwood growing stock has increased from 37.6 billion to 63.0 billion cubic feet, or by 67 percent (app. tables 3.49 and 3.63). In the absence of intervention by humans, the natural successional trend over most of the region is toward hardwood. Most concerns about hardwood inventories are not about quantity but about quality and availability.

About 20 percent of the hardwood timber in the region occurs on sites with year-round water problems or on slopes of 40 percent or steeper. In addition to the difficulty and high cost of logging these sites, there are many environmental concerns associated with these areas. Another factor affecting hardwood availability is the mixture of so many different species in many hardwood stands. Hardwood producers are often faced with the problem of harvesting and marketing large quantities of less desirable species in the process of harvesting certain select species. Many of the older hardwood stands reflect a history of periodic highgrading.

The rapid increase in hardwood inventories over the past 30 years is not expected to continue. Because of the low use of hardwoods relative to softwoods, the age distribution of hardwood stands is skewed toward the older classes. Recent forest surveys in North Carolina, Virginia, and South Carolina measured reductions in the number of small-diameter hardwoods. Eventually, reductions will be noted in hardwoods of larger diameters. While some analysts believe hardwood substitution is the answer to softwood scarcities encountered in the region, others are skeptical of this idea. A permanent shift to greater dependence upon hardwoods would certainly require better management of the hardwood stands than periodically mining the best of the available timber.

By ownership, 75 percent of the inventory of hardwood growing stock is on other private land. The remaining inventory is roughly evenly divided between forest industry holdings and public lands. By forest management type, 63 percent of the hardwood inventory is in upland hardwood and mixed pine–hardwood stands. In 1952, only about half of the hardwood inventory was in these types, and almost 40 percent was in bottomland hardwood stands. Currently, about 6 percent of the hardwood inventory is in hardwood trees scattered among the pine types.

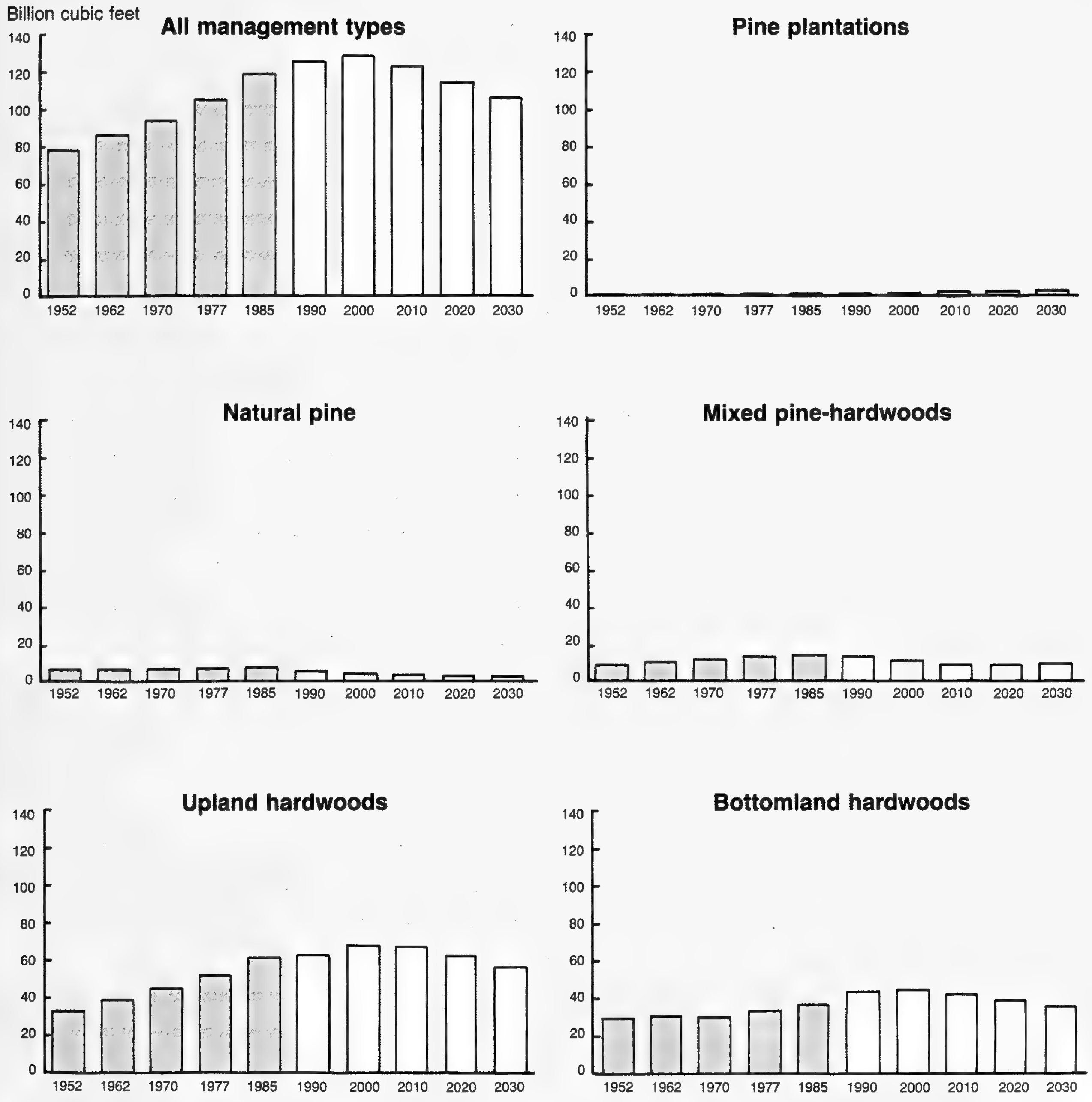


Figure 3.44—Hardwood inventory in the South by forest management type, 1952–85, with projections to 2030

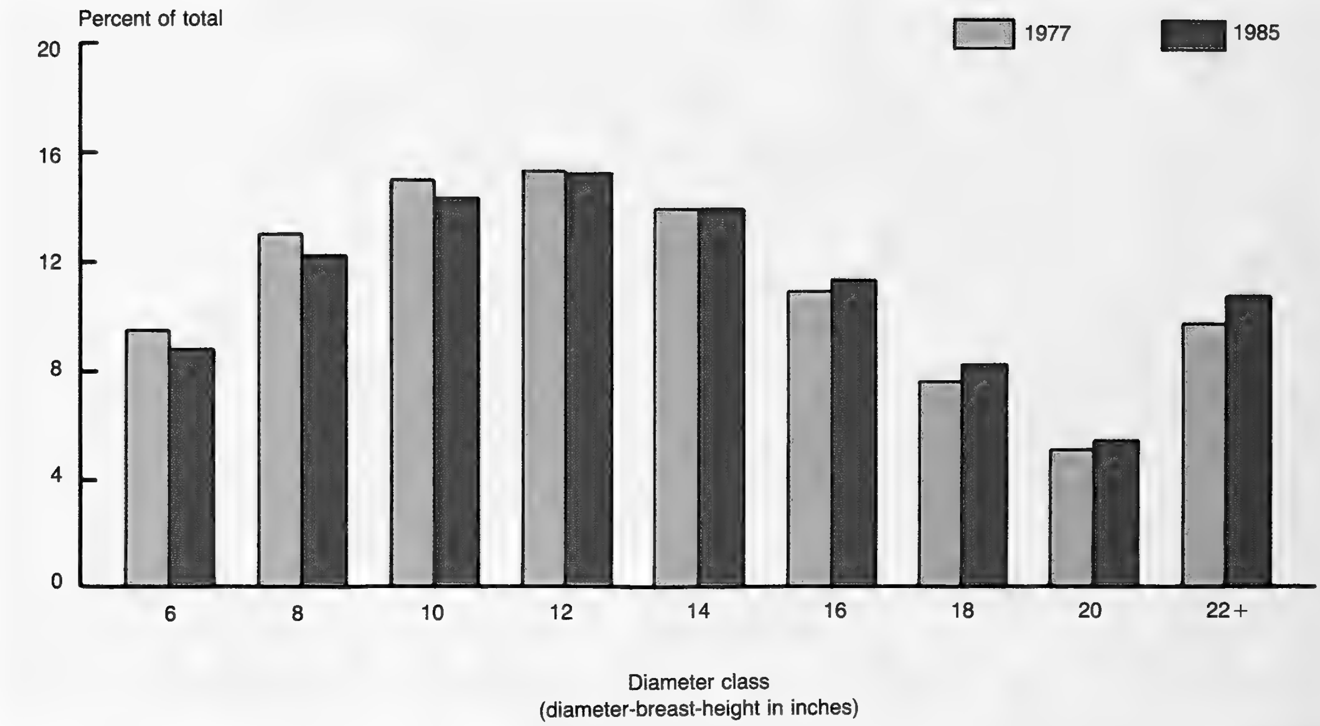


Figure 3.45—Percentage distribution of hardwood growing stock on timberland in the South, by diameter class, 1977 and 1985

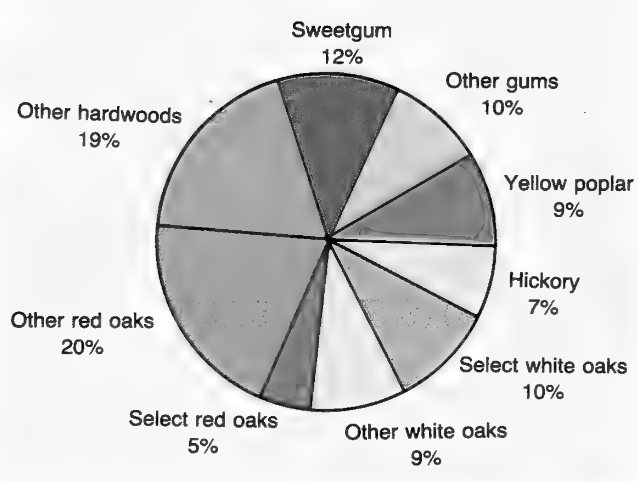


Figure 3.46—Percentage distribution of hardwood growing stock on timberland in the South, by species, 1985

Because of the large concentration of hardwoods in the southern Appalachian Mountains, North Carolina and Virginia are the leading States in hardwood inventory (fig. 3.47, app. tables 3.51–3.62 and 3.65– 3.76). Each of these States has more than 17 billion cubic feet of hardwood growing stock.

Collectively, oaks account for 40 percent of the current inventory of hardwood growing stock; gums, 23 percent; and yellow-poplar, 12 percent. Hickory, ash, and other hard-textured species account for 12 percent. Red maple and other soft-textured species make up the remaining 13 percent.

A further increase of 6 percent in the inventory of hardwood growing stock is projected for the Southeast between 1985 and 2000, before the trend turns down. Much of this increase occurs on other private land, primarily in the corporate and other individual categories. In fact, the buildup in hardwood inventories in these two owner categories continues beyond 2000. On public land, hardwood inven-

The inventory of hardwood timber increased by more than 50 percent between 1952 and 1985. However, a decline is in the offing. The outlook for hardwood timber in the South is much the same as that for softwoods—intensifying competition for timber and rising stumpage prices.

tories increase throughout the projection years. Most of the further increase in hardwood inventory will be in the upland hardwood type. Between 2000 and 2030, overall hardwood inventories in the Southeast are projected to decline about 8 percent.

Trends in the South Central Region

Hardwood growing stock inventories rose from 40.6 billion to 56.0 billion cubic feet between 1952 and 1985, a 38-percent increase (app. tables 3.50 and 3.64). The rate of increase has been fairly constant. Compared with softwoods, which increased more than 100 percent during this 32-year period, the hardwoods' rate of increase has been slow.

Increasing inventories result from excess growth over removals. The growth/removals ratio for hardwood was 1.17 in 1952, increased to 1.28 in 1962, 1.57 in 1970, and 1.78 in 1976, and then dropped back to 1.37 in 1984.

Trends in hardwood inventories have differed for different owner groups. The forest industry hardwood inventory showed large increases between 1952 and 1962 and between 1970 and 1976. Other private hardwood inventories were relatively flat between 1952 and 1970, then began increasing more rapidly. These trends are strongly correlated with hardwood type acreage trends and, to a lesser extent, the aging process of hardwood stands.

Hardwood growing stock in the upland type has increased steadily, with the biggest increase occurring in the last 8 years. This primarily reflects increased stocking and the

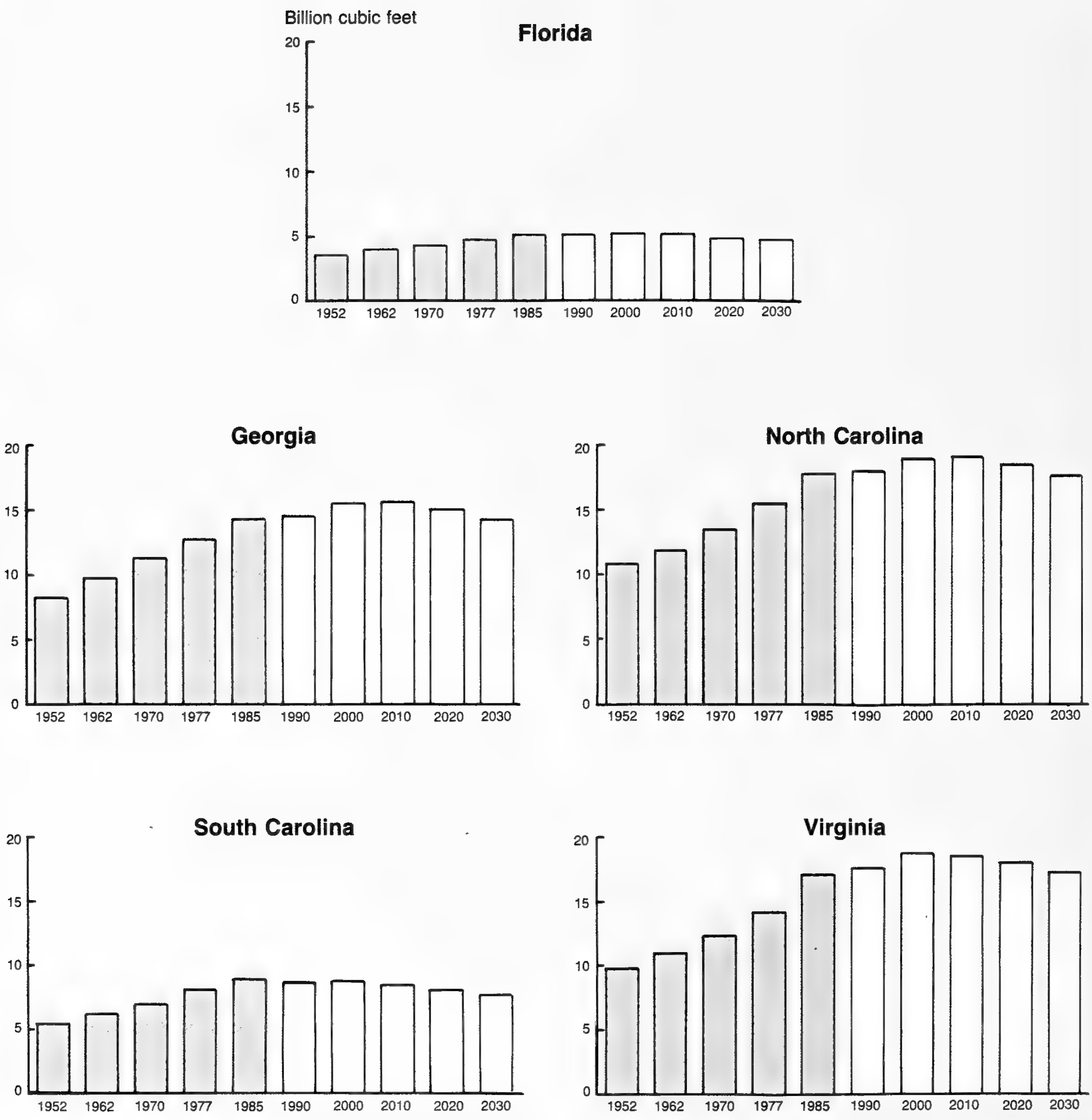


Figure 3.47—Hardwood inventory in the Southeast region by State, 1952–85, with projections to 2030

aging of many stands (total upland hardwood acreage having been quite stable at roughly 34 million acres). The bottomland hardwood inventory has, over the long term, increased despite a loss of 20 percent of the acreage present in 1952. Average volume and tree diameters have both increased during this period.

The hardwood situation is actually much more complex than indicated by these summary statistics. Upland hardwoods in the interior regions of Tennessee and Arkansas have developed differently from upland hardwoods in the Coastal Plain States (fig 3.48, app. tables 3.51–3.62 and 3.65–3.76). Coastal Plain upland hardwoods tend to occupy cutover pine sites and are in poorer condition than hardwoods in the interior, which have been periodically high-graded but remain less disturbed overall. A recent survey in Louisiana showed that the average hardwood basal area of upland hardwood types declined from 62.6 square feet per acre in 1974 to 56.8 square feet per acre in 1984. In contrast, the data from Tennessee surveys in 1970 and 1980 show the average hardwood basal area of upland hardwood types increasing, from 77.4 to 84.0 square feet per acre. During the same periods, stocking of rough and rotten upland hardwoods in Louisiana increased from 37 percent to 40 percent of all live-tree basal area, and in Tennessee, the same component increased from 26 to 28 percent.

In general, the upland hardwood stands in Tennessee and Arkansas are in better condition than those in the Coastal Plain States in the South Central region. This situation reflects past cutting practices: stands in the upland States have been less disturbed.

Bottomland hardwoods in Louisiana are much better stocked than upland hardwoods. Average stocking of hardwood growing stock trees is 89.2 square feet per acre. The difference between bottomland and upland hardwood stocking is less pronounced if softwood stocking is included with the upland hardwood basal-area averages. Softwood stocking on upland hardwood types in Louisiana was about 10 square feet per acre in 1974 and 8 square feet per acre in 1984. Rough and rotten cull stocking on bottomland types in Louisiana has increased in a comparable way to increases on upland hardwood types, from 34 percent to 38 percent of all live-tree basal area.

In terms of volume, the trend has been toward higher growing stock volume, especially among larger diameter classes. The most recent survey in Louisiana showed declines in hardwood volumes in the 6-inch and 8-inch classes. Declining ingrowth coupled with increasing cull volumes foretell future volume declines as removals begin to exceed growth.

In addition to differences by type and region, hardwoods are much more variable in quality than softwoods for different species and in different localities. Hardwood producers are subject to local resource variations. Their concerns involve not only quality and location but availability as well. Hardwood availability is limited by a number of factors, including accessibility, ownership, location, site, and a tendency for desired species to be scattered among stands dominated by other species. This results in a situation in which statistics show more volume in the forest than may actually be available for harvest. Thus the hardwood supply situation becomes critical well before growth and removals come into balance.

A further increase of 10 percent in the inventory of hardwood growing stock is projected for the South Central region between 1985 and 1990. During this period, hardwood inventories increase in all owner classes, except corporate. By management type, the largest increase occurs in the bottomland hardwood type, where inventories increase by 28 percent. Beyond 2000, hardwood inventories in the South Central region turn down very sharply, dropping 28 percent by 2030.

Trends by State

In 1952, the inventory of hardwood growing stock in the South exceeded the inventory of softwood in all but three States: Florida, Georgia, and Texas (figs. 3.47 and 3.48, app. tables 3.51–3.62 and 3.65–3.76). Since 1952, the

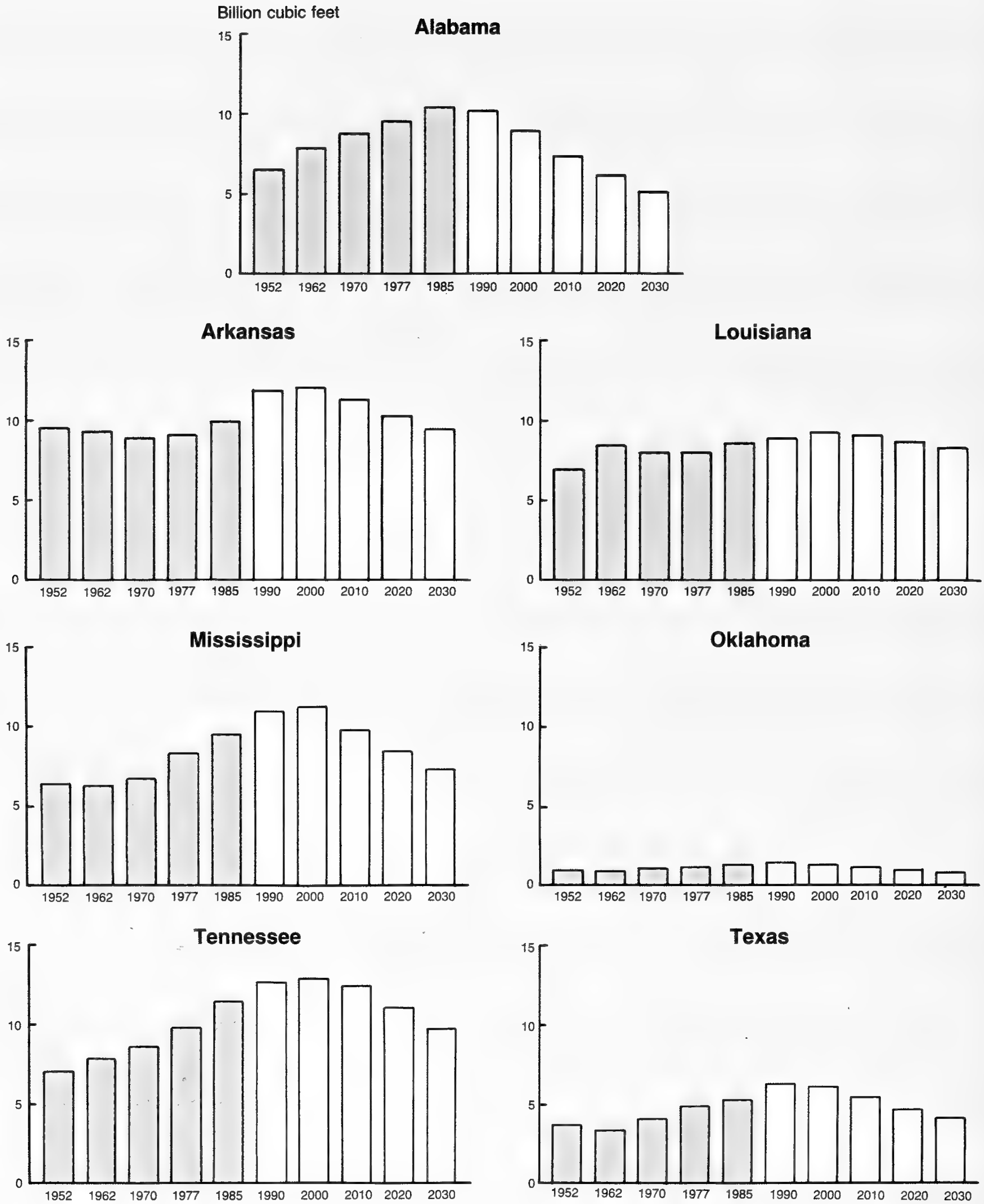


Figure 3.48—Hardwood inventory in the South Central region by State, 1952–85, with projections to 2030

inventory of hardwoods has increased in every State; however, the increases have been relatively small in Arkansas, Louisiana, and Mississippi. During much of the period, in these States, there was extensive hardwood clearing along the Mississippi River. The largest increases in hardwood inventory have occurred in Virginia, North Carolina, Georgia, and Tennessee. In 1985, the inventory of hardwood growing stock still exceeded the inventory of softwood by a substantial margin in five of the States: North Carolina, Virginia, Tennessee, Arkansas, and Oklahoma.

Most of the projected increase in hardwood inventory in 1990 is in Arkansas, Mississippi, Virginia, and Tennessee. Beyond 2000, decreases are projected in the inventory of hardwood in every State. The largest decreases are projected in Mississippi, Alabama, Tennessee, and Arkansas.

A Qualified View on Projected Changes in Timber Resources

As indicated in various ways in the preceding discussion, there are many uncertainties associated with the assumptions and basic data used in making projections of changes in the timber resource.

More intensive management or planting large areas of marginal cropland and pasture to trees could lead to higher levels of timber growth and inventories. On the other hand, they could just as well be lower as a result of larger shifts in timberland to other uses, more constraints on timber management associated with protection of the environment and multiple use, or extraordinary mortality losses. On the basis of the available information, there seems to be no way to determine that the projections are either high or low.

Thus, in appraising the projections that have been presented here, the basic objective of making them should be kept in mind. They are designed to show developing timber-resource problems, and to do that in time to change policies and programs affecting timber productivity if this seems desirable to society.

As stated at the beginning of this chapter, there is no intent to predict that the projected changes will actually occur, nor that they should. Chapter 4 quantifies the likely impacts of projected changes in the resource on stumpage and product prices, on income and employment in the forest industries, and on State and local governments. The analysis in chapter 4, in fact, suggests a need for changing the projected trends and moving toward growing a forest that will be of greater benefit to the economy and society of the South and of the Nation.

Literature Cited

Abt, Robert C. 1987. A "top-down" approach to modeling State forest growth, removals and inventory. SCFER Work. Pap. 36. Research Triangle Park, NC: Southeastern Center for Forest Economics Research. 25 p.

Adams, D.M.; Haynes, R.W. 1980. The 1980 softwood timber assessment market model: structure, projections, and policy simulations. For. Sci. Monogr. 22. Bethesda, MD: Society of American Foresters. 64 p.

Alig, R.J. 1986. Econometric analysis of forest acreage trends in the Southeast. Forest Science. 32: 119–134.

Alig, R.J. 1985. Modeling acreage changes in forest ownerships and cover types in the Southeast. Res. Pap. RM–260. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 14 p.

Alig, R.J.; Wyant, J.G. 1985. Projecting regional area changes in forest-land cover in the U.S.A. Ecological Modeling. 29: 27–34.

Birdsey, R.A.; McWilliams, W.H. 1986. Forest area trends in the Mid-south. Resour. Bull. SO–107. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. 17 p.

Boyce, S.G.; Knight, H.A. 1979. Prospective ingrowth of southern pine beyond 1980. Res. Pap. SE–200. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 50 p.

Boyce, S.G.; Knight, H.A. 1980. Prospective ingrowth of southern hardwoods beyond 1980. Res. Pap. SE–203. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 33 p.

Clephane, T.P. 1978. Ownership of timber: a critical component of industrial success. Forest Industries. 105(9): 30–32.

Council of Economic Advisers. 1986. Economic report of the President. Washington, DC: Council of Economic Advisers. 378 p.

Fecso, R.S.; Kaiser, H.F.; Royer, J.P.; Weidenhamer, M. 1982. Management practices and reforestation decisions for harvested southern pinelands. Staff Report AGE5821230. Washington, DC: U.S. Department of Agriculture, Statistical Reporting Service. 74 p.

Healy, R.G. 1985. Competition for land in the American South: agriculture, human settlement, and the environment. Washington, DC: The Conservation Foundation. 334 p.

Knight, H.A. 1985. Southern U.S. timber supplies. In: Proceedings of 3d North America international institute for applied systems network meeting; 1985 March 21–23; Victoria, BC. Vancouver, BC: University of British Columbia: 27–37.

Larson, R.W.; Goforth, M.H. 1974. TRAS: a timber volume projection model. Tech. Bull. 1508. Washington, DC: U.S. Department of Agriculture, Forest Service. 15 p.

McClure, J.P.; Knight, H.A. 1984. Empirical yields of timber and forest biomass in the Southeast. Res. Pap. SE–245. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 75 p.

Moulton, Robert J.; Dicks, Michael R. 1987. Implications of the 1985 Farm Act for forestry: the sleeping giant. In: Proceedings of the 1987 joint meeting of the Southern Forest Economics Workers and the Midwest Forest Economists, The Blue and the Gray; 1987 April 8–10; Asheville, NC. Raleigh, NC: North Carolina State University: 163–176.

O'Laughlin, J.; Ellefson, P.V. 1982. New diversified entrants among U.S. wood-based companies: a study of economic structure and corporate strategy. Bull. 541. St. Paul, MN: University of Minnesota, Minnesota Agricultural Experiment Station. 63 p.

Royer, J.P. 1985. The effects of markets and public policies on the reforestation behavior of southern landowners. Work. Pap. 12. Research Triangle Park, NC: Southeastern Center for Forest Economics Research. 61 p.

Sheffield, R.M., and others. 1985. Pine growth reductions in the Southeast. Resour. Bull. SE-83. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 112 p.

Tedder, P.L.; LaMont, Richard M.; Kincaid, Jonna C. 1987. The timber resource inventory model (TRIM): A projection model for timber supply and policy analysis. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 82 p.

U.S. Department of Agriculture, Soil Conservation Service. 1982. 1980 Appraisal: soil, water, and related resources in the United States. Part 1: Status, condition, and trends. Part 2: Analysis of resource trends. Washington, DC: U.S. Department of Agriculture, Soil Conservation Service. 328 and 296 p.

U.S. Department of Commerce, Bureau of the Census. 1966. Housing construction statistics 1889 to 1964. Washington, DC: U.S. Department of Commerce, Bureau of the Census. 805 p.

U.S. Department of Commerce, Bureau of the Census. [Monthly.] Housing starts. Constr. Reps. Ser. C20. Washington, DC: U.S. Department of Commerce, Bureau of the Census.

U.S. Department of Commerce, Bureau of the Census. 1985. Population estimates and projections: estimates of the population of the United States and components of change: 1970 to 1984. Curr. Pop. Reps. Ser. P-25, No. 971. Washington, DC: U.S. Department of Commerce, Bureau of the Census. 15 p.

U.S. Department of Commerce, Bureau of the Census. 1986. Population estimates and projections: estimates of the population of the United States to May 1, 1986. Curr. Pop. Reps. Ser. P-25, No. 989. Washington, DC: U.S. Department of Commerce, Bureau of the Census. 2 p.

U.S. Department of Commerce, Bureau of the Census. 1979. Population estimates and projections: estimates of the population of the United States and components of change: 1940 to 1978. Curr. Pop. Reps. Ser. P-25, No. 802. Washington, DC: U.S. Department of Commerce, Bureau of the Census. 14 p.

U.S. Department of Commerce, Bureau of the Census. 1984. Population estimates and projections: projections of the population of the United States, by age, sex, and race: 1983 to 2080. Curr. Pop. Reps. Ser. P-25, No. 952. Washington, DC: U.S. Department of Commerce, Bureau of the Census. 175 p.

Wharton Econometric Forecasting Associates. 1986. Long-term alternative scenarios and 20-year extension. Vol. 4, No. 1. Philadelphia: Wharton Econometric Forecasting Associates. 358 p.

Chapter 4

Implications of the Base Projections of Changes in the Timber Resource and of Other Selected Futures

The base projections of net annual softwood growth in this study are the product of a level of timberland management that is much more intensive than that practiced today. By 2030, the area in pine plantations more than doubles, and large areas of mixed pine–hardwoods and upland hardwoods are converted to pine. It was also assumed that there would be substantial increases in timber yields and in the intensity of management in pine plantations.

Economic and Environmental Implications of the Base Projections of Resource Changes

The material in the preceding chapter quantified and described the kinds of changes in the timber resource—the base projections—that are likely to take place if current expectations about major demand and supply determinants are realized. Timber is a basic raw material in the South and in the Nation, and the projected changes in the resource have important regional and national economic and environmental impacts. The most significant of these are described in this chapter.

The discussion of impacts is followed by a discussion of some of the effects that changing the basic demand and supply assumptions would have on the base projections discussed in chapter 3. Some of these simulations of other futures are sensitivity analyses designed to show what would happen given different assumptions on trade or timber product yields. Most, however, are designed to show what would happen to the timber resource and the associated parts of the economy and environment under various policies, programs, and legislation currently being considered. The resulting measures of changes in the timber resource and the associated changes in prices, employment, wages and salaries, and other economic and environmental measures provide a quantitative basis for making decisions about legislation and forest policies and programs.

The base projections of resource changes presented in chapter 3 will influence sawtimber and pulpwood stumpage prices, lumber and plywood production, pulpwood consumption, lumber prices, softwood lumber imports, and employment and wages and salaries in forest industries. The projections will also affect investments in forest management and plants and equipment, State and local government revenues, forage, wildlife, fish, and water. The changes in these economic and environmental measures are important by themselves, but they also provide a basis for comparison with changes resulting from simulating other futures, especially those concerned with legislation and policies and programs.

Because of limited data and associated analytical problems, many of the estimates quantifying the economic and environmental implications of the base projections and the simulations are only general approximations. They are, however, the result of a structured effort to compile and analyze the existing data. They should provide broad measures of the magnitudes of change and of the difference among simulations, both of which will be useful to executives, legislators, and administrators who make decisions about legislation and forest policies and programs.

Readers need to keep in mind also that base projections are the product of a level of timberland management that is much more intensive than that practiced today. By 2030, the area in pine plantations in the South is nearly doubled; large areas of mixed pine–hardwoods and upland hardwoods are converted to pine. Planting or conversion of these areas to pine would require investments of $2.7 billion, most of it invested within the next 15 years. Substantial increases in timber yields and in the intensity of management were also assumed for large areas of pine plantations. Thus, the base projections reflect what would happen if (1) forestry in the South continues to progress, and (2) there is continued expansion in the technical and financial assistance, protection, research, education, and management programs that have brought about the improved forestry situation in the past.

Sawtimber and Pulpwood Stumpage Prices

Among the economic consequences of the projected base-level changes in the timber resource are rising real prices of stumpage—prices net of inflation or deflation. There are substantial increases in softwood sawtimber stumpage prices (fig. 4.1, app. tables 4.1 and 4.2). Price increases in the southern regions are the largest between 1984 and 2000, a time in which softwood timber inventories are

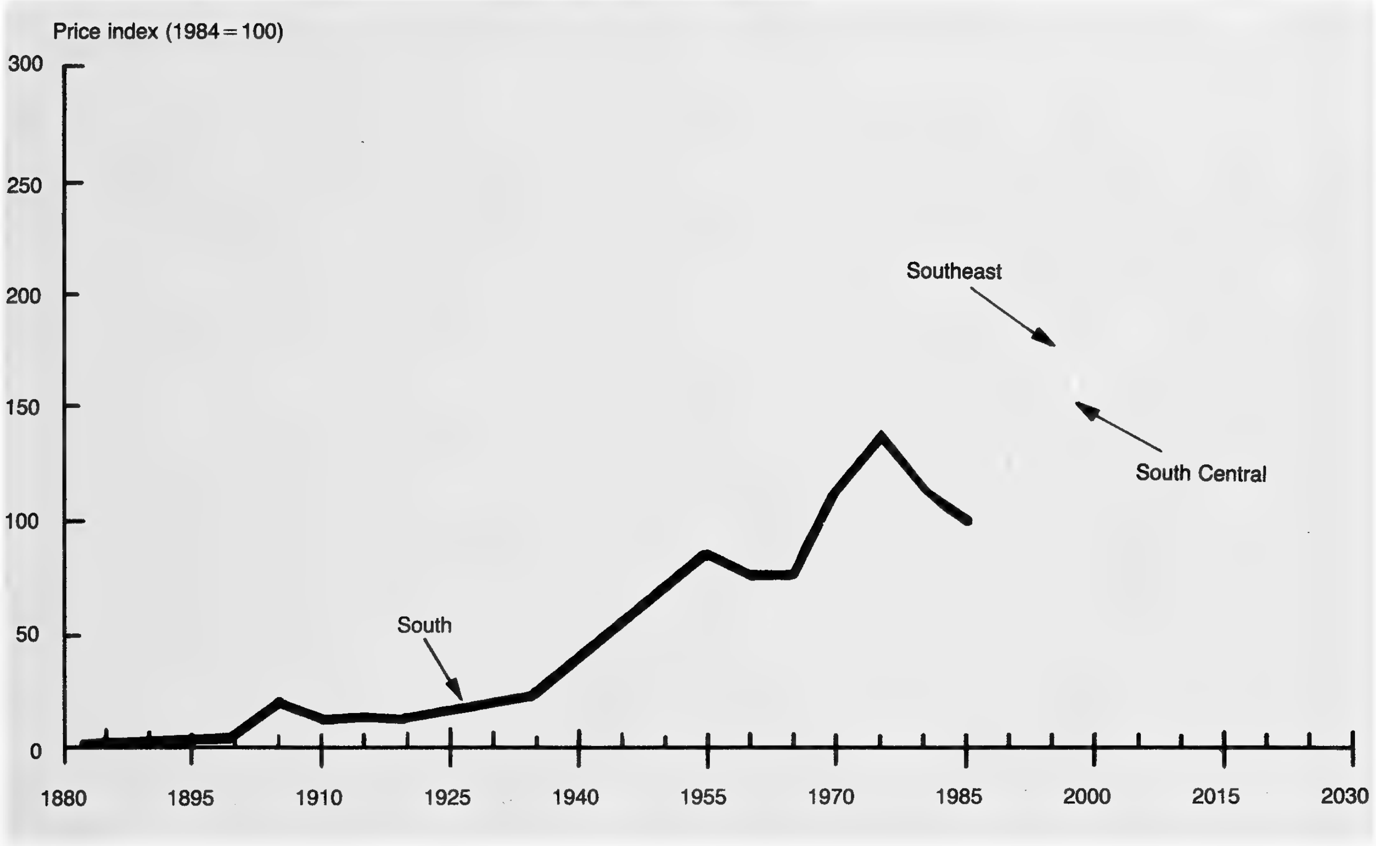


Figure 4.1—Softwood sawtimber stumpage price indexes in the South, 1880–1985, with base projections by region, 1990–2030

declining. Between 1984 and 2000, for example, softwood sawtimber prices rise at an annual rate of 3.2 percent in the South Central region. After 2000, as inventories begin to rise, the rates of increase slow down. Between 2020 and 2030, increases in the South Central region average only 0.5 percent per year.

The rates of increase in the Southeast are somewhat different. Stumpage prices rise more rapidly than in the South Central region until 2000 (4.4 percent per year) and then more slowly until the last decade of the projection period. In terms of actual dollar prices, the southern regions will have the highest prices of all timber-producing regions until late in the projection period, when stumpage prices in the Pacific Northwest–Westside become the highest.

Projected rates of softwood stumpage price increases in most other regions are greater than in the two southern regions. Stumpage prices in the Pacific Northwest–Westside are expected to go up at roughly 2.8 percent per year for the next four and a half decades. Prices there rise most rapidly after 2000. Stumpage prices in the Rocky Mountain section increase at roughly 5.8 percent per year and those in the North at 2.3 percent a year. Prices will increase most rapidly between now and 2000, although prices in the North will continue to go up rapidly through 2010.

Softwood pulpwood stumpage prices in both the Southeast and South Central regions rise at about the same rate as sawtimber stumpage in the first part of the projection period until 2000 (fig. 4.2, app. table 4.1). They increase slowly during the next two decades, but by the decade from 2020 to 2030, pulpwood stumpage prices are rising at a 3.5-percent annual rate in the South Central region.

Hardwood sawtimber stumpage prices show trends much different from those for softwoods. Prices for hardwoods decline in both the southern regions until 2000 (fig. 4.3, app. table 4.3). They show similar trends in the northern regions (app. table 4.4). These trends reflect the availabil-

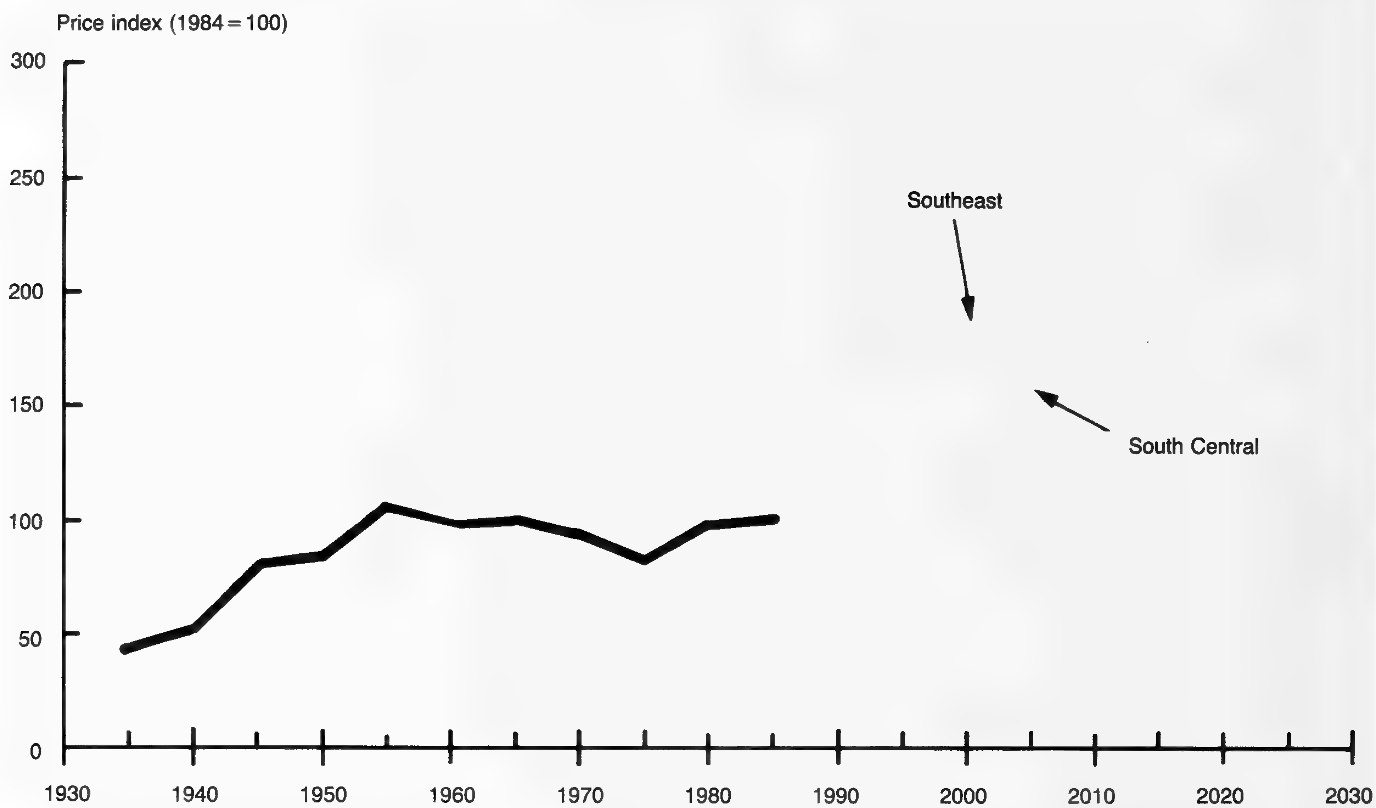


Figure 4.2—Softwood pulpwood stumpage price indexes in the South, 1935–85, with base projections by region, 1990–2030

ity of large and increasing inventories of hardwood timber. After 2000, as timber removals rise above net annual growth and inventories begin to decrease, prices begin to rise. In the last two decades of the projection period, they are going up at a rate of 1.4 percent per year in the South Central region and 1.2 percent in the Southeast. Prices are rising in the Northeast and North Central regions at a slower rate.

These projected price increases for hardwood sawtimber stumpage are for the smaller, lower quality hardwood timber that composes the bulk of hardwood timber inventories. The stumpage price outlook for larger hardwood timber of preferred species, such as select white and red oak, ash, and black cherry, is different. Removals of higher quality sawtimber of most preferred species have been close to or above net annual growth, and there have been large increases in stumpage prices in the past. This situation seems likely to continue.

The regional differences in stumpage prices in the South, and in the Nation, are caused by a number of complex forces. In general, they reflect the intensity of the competition for the available timber; differences in stumpage characteristics; and variations in regional logging, manufacturing, and transportation costs.

Increases in stumpage prices are reflected in the prices of sawlogs, pulpwood, and other roundwood used in the forest industries. These roundwood price increases, which represent increased costs to the processing industries, are passed on in the prices of products, especially those of lumber and softwood plywood, where roundwood represents a large part of the product cost.

The projected increases in softwood and hardwood lumber prices are shown in figure 4.4 and appendix tables 4.2 and 4.4. The trends are similar to those for stumpage. Soft-

Figure 4.3—Hardwood sawtimber stumpage price indexes in the South, 1905–85, with base projections by region, 1990–2030

wood lumber prices go up at a 1.7-percent annual rate in 1980's and 1990's but slow down over the rest of the projection years. Hardwood lumber prices show an opposite pattern, rising slowly in the early years and at increasingly faster rates in the later years.

Projected increases in lumber prices are consistent with the historical trends (fig. 4.4). Since 1800, the price of lumber, after adjustments for inflation and deflation, has been rising at an average rate of 1.7 percent per year. The historical increases have not been evenly spread, however. There have repeatedly been periods of a decade or so where prices showed little change or declined, followed by periods in which prices rose rapidly.

Rising product prices constrain the demands for timber products and in turn the demand for timber. They also have some broader impacts on the economy, society, and the environment. Recently these were documented in considerable detail in "An Analysis of the Timber Situation in the United States, 1952–2030" (USDA Forest Service 1982).

From an economic point of view, the greatest losses from rising real prices of stumpage will be sustained by consumers. Home buyers will be the most affected. The cost of new dwellings will increase. The number, average size, and quality of units built will also be adversely affected. Everyone in the society uses wood from trees in some form—as housing, furniture, containers, writing paper, books and newspapers, fuel, and hundreds of other ways—and will be adversely affected.

The effects of rising real prices of stumpage on the rate of use of nonrenewable resources and the environment are also important. As timber prices rise, and more steel, aluminum, and plastics are substituted for wood, there will be an acceleration in the use of nonrenewable resources, particularly fuel and metal minerals. There will also be rising environmental costs, chiefly from larger emissions of air and water pollutants resulting from the added mining, industrial processing, and power generation associated with the greater use of substitute materials.

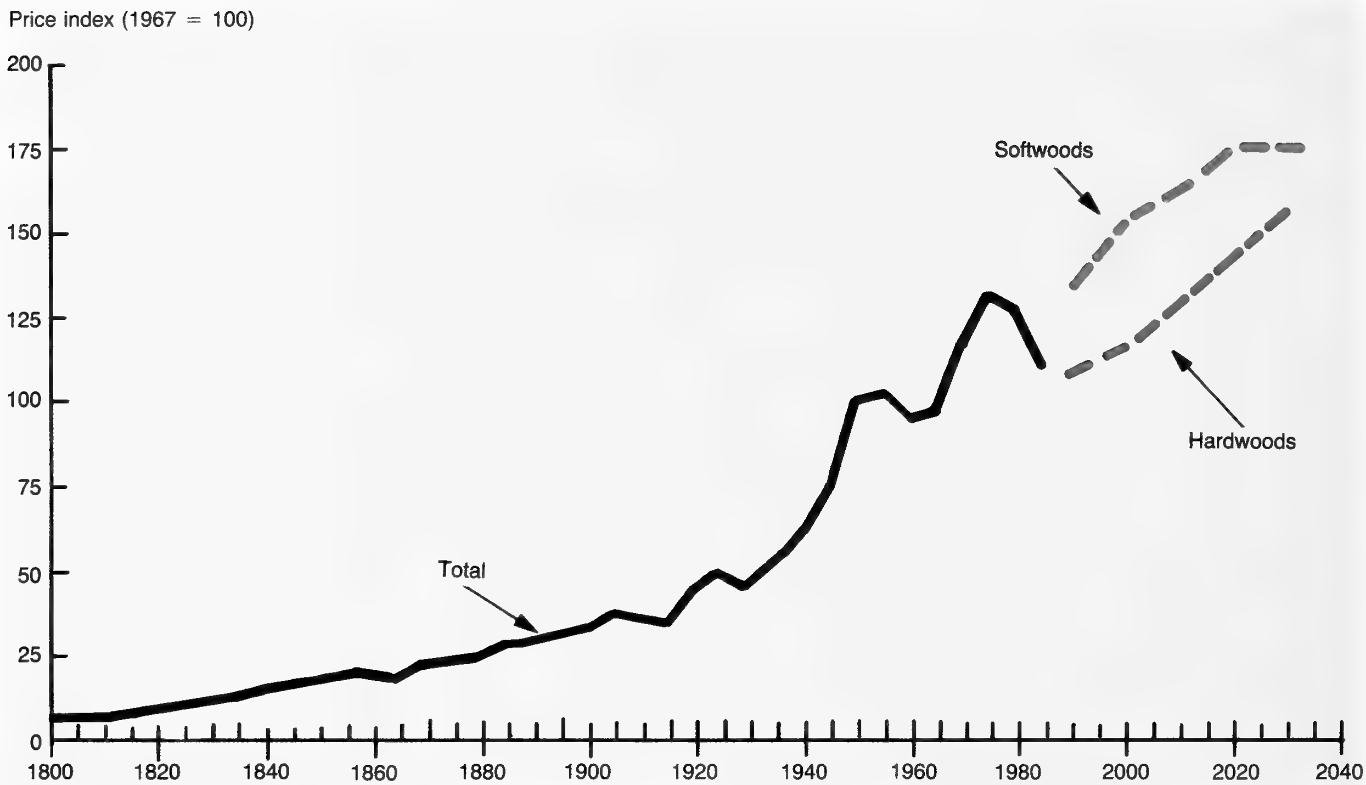


Figure 4.4—Average relative producer price index for lumber, 1800–1984, with base projections for softwood and hardwood lumber price indexes for selected years 1990–2030

From an economic point of view, consumers will sustain the greatest losses from rising real prices of stumpage. Everybody uses wood in some form—such as housing, furniture, containers, writing paper, books and newspapers, fuel, and hundreds of other ways—and everybody will be adversely affected.

Lumber and Plywood Production and Pulpwood Consumption

In the highly competitive markets in which nearly all timber products are sold, rising product prices act to reduce demand. This is one of the contributing causes to the slowing of the growth in total projected demands for softwood lumber shown in table 3.4. However, largely because of comparative cost advantages over other lumber-producing sections in the United States (due in part to timber supplies), there are substantial increases in softwood lumber production in both regions in the South. The largest increase is in the South Central region (app. tables 4.1 and 4.2). There are also substantial increases in the Pacific Southwest and in the North. In contrast, production in the Pacific Northwest, the Nation's other major softwood lumber-producing section, shows little change over most of the projection period. There is also little change in projected production in the Rocky Mountain section.

Hardwood lumber production increases in both regions in the South, with the largest rise in the Southeast (app. ta-

ble 4.3). Hardwood lumber production increases even more rapidly in the Northeast and North Central regions, where large hardwood inventories also exist (app. table 4.4). By 2030, hardwood lumber production in the North is about equal to that in the South.

Softwood plywood production rises in both southern regions, especially in the South Central region, where it goes up 1 billion square feet (3/8-inch basis). As with lumber, this rise in production reflects a comparatively favorable resource and stumpage-cost situation. Softwood plywood production also increases in the Rocky Mountain section. In contrast, production drops in the Pacific Northwest and by 2030 is 1.4 billion square feet under the 1984 level.

Projected domestic woodpulp production increases from 57.7 million tons in 1984 to 100.9 million tons in 2030. Production in the South rises from 33.8 million tons now to 60.3 million tons by 2030. Regional shares of woodpulp production (which in 1984 were 17, 18, and 65 percent for the West, North, and South, respectively) change by 2030 to 12, 28, and 60 percent.

The projected increases in consumption of softwood roundwood pulpwood are small in both southern regions, amounting to a little over 300 million cubic feet. The consumption of softwood plant byproducts goes up about 600 million cubic feet.

The projected increase in consumption of hardwood roundwood pulpwood is 1.1 billion cubic feet, with the increase about equally divided between the Southeast and South Central regions. The much larger rise in use compared to softwoods reflects the large inventories of hardwood timber and associated lower stumpage and wood costs. It also reflects a shift to pulping technologies that can use larger volumes of hardwoods. Projected use of hardwood plant byproducts rises a little in the Southeast and declines by a smaller amount in the South Central region.

Softwood Lumber Imports

Projected softwood lumber imports, nearly all from Canada, drop from 14.1 billion board feet in 1984 to 11.7 billion in 2030 (app. table 4.2). This decrease is due to changes in relative wood costs between the producing regions of the United States and Canada. Canadian producers face the prospect of rapidly rising delivered wood costs as Canadian harvests come increasingly from the higher cost areas further north. Rising softwood timber inventories in the South after 2000 provide the resource base for an expansion in southern lumber production that also acts to reduce Canadian imports. Further, this expansion mitigates some of the decline in the U.S. Pacific coast regions.

The projections showing that Canadian softwood timber harvests have reached a peak and that a falldown will take place are based on current expectations about the Canadian timber situation. However, because of data and analytical limitations, the Canadian timber situation has never been adequately assessed. Thus, the decline in harvests and the timing are largely matters of judgment. A falldown at some point does seem inevitable. But there is enough softwood timber in Canada to sustain current harvests for a few decades.

As in the United States, there are many opportunities in Canada to increase and sustain softwood timber harvests. However, achieving this potential will require much larger investments in regeneration and other management practices, in research, and in education. It will also take time. There, as in the South, the forces that make a decline in timber harvests inevitable are not easily or quickly changed.

Employment and Wages and Salaries in the Forest Industries

Employment in the forest industries shows large declines over the projection period (fig. 4.5, app. table 4.5). Be-

In the highly competitive markets in which nearly all timber products are sold, rising prices constrain demands. As a result, projected timber harvests go up slowly in the South. The increases are too small to sustain employment in the forest industries, which by 2030 is some 85,000 people below the 1984 levels.

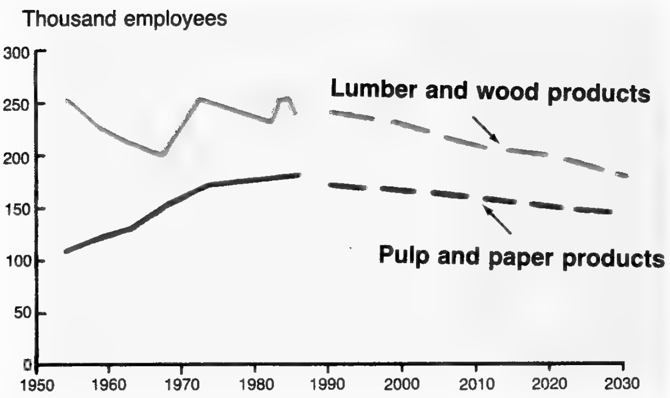


Figure 4.5—Employment in lumber and wood products and pulp and paper products industries in the South, selected years 1954–85, with projections to 2030. Lumber and wood products include all industries in Standard Industrial Classification (SIC) 24, including mobile homes (SIC 2451) beginning in 1972. Pulp and paper products include all industries in SIC 26.

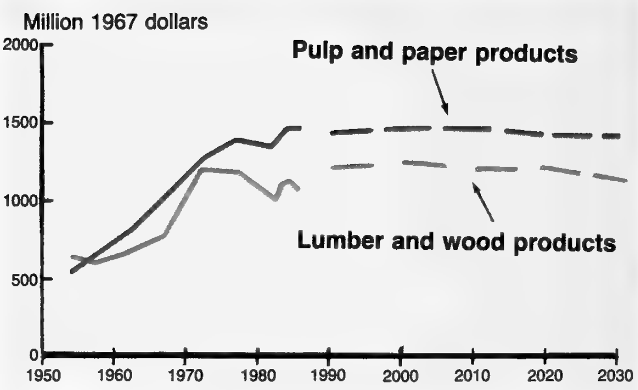


Figure 4.6—Wages and salaries in lumber and wood products and pulp and paper products industries in the South, selected years 1954–85, with projections to 2030. Lumber and wood products include all industries in Standard Industrial Classification (SIC) 24, including mobile homes (SIC 2451) beginning in 1972. Pulp and paper products include all industries in SIC 26.

tween 1984 and 2030, employment in the lumber and wood products industry drops by 54,000 people and that in pulp and paper products industry drops by 31,000. By 2030, employment in both industries falls by 85,000, a 21-percent decrease. Total wages and salaries also start to decline after 2000.

These downward trends are a reversal of the increases that have taken place in recent decades. The projected rise in timber supplies (harvests) is not large enough to sustain the rising employment of the past three decades. Rising productivity per employee overrides the projected increases in harvests.

On the other side; rising productivity is passed on as higher wages and salaries per employee. As a result, wages and salaries (in constant dollars) for both industries increase for a while, although at much slower rates than over the past 30 years (fig. 4.6). Beyond 2000 even these modest increases cannot be sustained, and wages and salaries also begin to decline.

The drop in employment and wages and salaries is of great economic significance to the South. The forestry sector will decrease in importance. The effects will be multiplied as they spread through the trade, service, transportation, and other parts of the southern economy that provide goods and services to the forestry sector. It is currently estimated, for example, that a loss of one job in the lumber and wood products industry would result in a decrease of 2.3 jobs throughout the economy in the Southern States. A one-job loss in the pulp and paper products industry would be multiplied 2.6 times as other parts of the economy are affected.

Investments in Forest Management

As described in the preceding chapter of this study, the base timber resource projections are the result of a set of assumptions on management practices, including large increases in the area of pine plantations and timber yields. These increases can be achieved only through additional investments in regeneration, including site preparation where needed, stand conversion, precommercial and commercial thinning, stocking control, harvest of mature stands, and salvage harvest and regeneration.

To achieve the increases in growth shown in the base projections, an investment of $2.7 billion would be needed to establish pine plantations on private timberlands between 1984 and 2030, with most of the investments made in the next 15 years. Large additional investments would be needed for intermediate stand treatments, treatments not involving area change in management types, and treatments on public lands.

Investments in Plants and Equipment

Processing the timber harvests shown in the base projections into products such as lumber, plywood, and woodpulp will require investments to (1) maintain the existing plants and equipment, and (2) add the capacity necessary for processing the increased volume of timber harvested.

The total investments required in the South are large. They rise from about $1.9 billion in 1984 to $3.2 billion in 2000 and on up to $3.4 billion in 2030 (app. table 4.5). Some 60 to 70 percent of the increase in investments is to maintain the existing plant capacity. This reflects the large size of the existing capacity compared to the additional capacity required to process the relatively small increases in timber harvests.

Roughly 95 percent of this investment is in the pulp and paper industry, largely due to the higher costs of the plants and equipment used in the manufacture of pulp and paper. The volume of wood processed and the projected increases are also larger in the pulp and paper industry than in the lumber and wood products sector.

The required investments are largest in the South Central region for both industries. The volume of wood processed in that region is somewhat bigger than in the Southeast.

State and Local Government Revenues

The area of timberland and timber harvest changes, including the associated changes in activity in the lumber and wood products and pulp and paper industries, will have an impact on State and local government revenues. The base projections show large increases: revenues more than double by 2030 in both regions (app. table 4.5). However, only a small part of the increase in revenues can be attributed to changes in the timber resource. The revenues shown are total general revenues and include (1) receipts from all State and local tax systems—income, property, sales, services, etc.; (2) receipts from all State and local fee or charge mechanisms—drivers' licenses, automobile registrations, etc.; and (3) transfer payments from the Federal Government.

Thus the base projections shown in appendix table 4.5 are not a meaningful measure of effects of changes in timberland area and timber harvests on revenues. These base projections do provide a base for comparison with the other futures analyzed. The differences between the base and the revenues shown for the other futures are measures of the effects of changes in the timber resource. These are described in the appropriate places below.

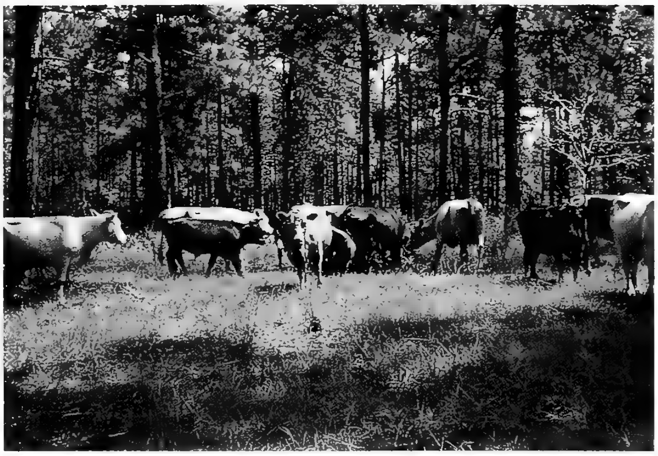
Forage, Wildlife and Fish, and Water

The projected changes in land use and in the timber resource, including the associated changes in timber management, start a complex system of changes in the natural environment and natural resources. These are all important in various ways to the economy and general social well being. Thus, in making decisions that bring about changes in land use and timber policies and programs, it is important to have a measure of the likely impacts on the environment and natural resources other than timber.

Because of limitations in time and data, it has not been possible to analyze an extensive array of impacts. The analysis in this study is directed at forage production; the abundance of white-tailed deer, wild turkey, and trout; distribution of red-cockaded woodpecker; and water quantity. The white-tailed deer and wild turkey were chosen because they are the two most important game species in the South. Trout are also important game species. The red-cockaded woodpecker was chosen because of its regionwide distribution, its sensitivity to timber management practices, and its status as an endangered species.

The estimates of impacts shown below, as with most of the other estimates of economic and environmental impacts, are general approximations of what could happen as the result of changes in land use and in the timber resource, including the associated changes in timber management as specified in this study. Investments in management programs for forage, wildlife, fish, and water are held at current levels. There was not enough time to study and quantify adequately the effects of the likely intensification of management programs for these resources. In recent decades, great improvements have been made in the management of many forest resources, especially wildlife, fish, and water. These improvements will undoubtedly continue. There will be in the future, as in the past, rising investments in programs to mitigate the adverse impacts of timber management programs and to increase wildlife and fish populations and water quantity and quality.

In appraising the estimates of impacts on forage, wildlife, fish, and water from changes in land use and in timber resources, the fact that investments in management programs for nontimber resources are held constant is of great significance. The estimates do not show what is likely to happen with continued improvements in management pro-



The projected changes in the timber resource and associated changes in timber management will have important effects on forage, wildlife, water, and in some degree on all the products and uses of forest lands and waters.

grams for these resources but only the impacts associated with changes in land use and the timber resource.

The estimates of impacts reflect changes in land use and timber stand conditions on the total land base. Changes in land use, in forest management types, and in timber age classes are the chief determinants of changes in forage production, wildlife and fish distribution and abundance, and water quantity. The overall patterns of land use and forest types are similar in the Southeast and South Central regions: timberland and pasture areas decline over the projection period. The areas with intensive human-related use, such as urban areas and roads, show significant gains.

The most notable change in forest management types is the conversion of natural stands to pine plantations. The largest part of the conversion comes from natural pine, but substantial acreages of mixed pine–hardwoods and upland hardwoods are also converted. Changes in age classes differ between regions largely because of differences in the age-class distributions at the start of the projection period. The largest changes over the projection period are the gains in the older hardwood age classes in the South Central region and the loss of pine in the older age classes, mostly in the Southeast.[1]

Forage Production—Forage production on all lands, including pasture, range, and timberland, shows a small decline—from 54.4 million to 50.6 million tons in the Southeast and from 71.8 million to 62.3 million tons in the South Central region—over the projection period (app. table 4.6). These decreases reflect a drop in the acreage of pasture and range in both regions.

Forage production on timberlands rises over most of the projection years. The bulk of the increase is in the South Central region, where forage production goes up from 7.6 million to 10.4 million tons by 2020. The increase in the Southeast is much smaller—from 9.4 million to 9.9 million tons in 2000. There is some decline in both regions after the peak years in 2020 and 2000. Forage on timberland is produced primarily in younger stands; thus the changes in production follow the shifts in acres across both old and young age classes.

During part of the year in the South, when the nutritional quality of the forage on timberland is low, pasture is often used to maintain livestock. The area of pasture in the South, however, decreases over the projection years. Utilization of the increased forage production on timberland might require more intensive management of the remaining area of pasture and increased use of crop aftermath and supplemental feeding.

Using forage from timberlands year round is possible. But it will require the implementation of measures such as more frequent burning of timberland, the use of fertilizers to increase the quantity and quality of forage, and the planting of forage species, such as subterranean clover, which hold nutritional quality better.

White-Tailed Deer—By 2030, the average density of white-tailed deer per square mile drops from 17.0 to 14.0 in the Southeast and from 17.7 to 14.5 in the South Central region (app. table 4.6). This decline is due in part to the decrease in the area of upland hardwoods and the conversion of natural pine and oak–pine to pine plantations. The major land use change contributing to decline in deer populations is the growth in the area with intensive human-related use, particularly urban and road use. The added acreage in such uses directly reduces available deer habitat. The associated increases in hunting (legal and illegal) and other human-related disturbance also raise deer mortality.

The decline in deer numbers also reflects the assumption of holding investments in wildlife management programs at current levels. More intensive management could maintain and in some areas increase deer populations. Measures such as those described for improving forage will also benefit deer. In addition, controlling the size, shape, and distribution of clearcuts and pine plantings; thinning stands; maintaining management types that produce mast; and planting the food plants deer prefer could maintain or increase deer populations. Improving enforcement of game laws and providing timberland owners with technical assistance on desirable management practices could also contribute.

Wild Turkey—Wild turkey populations also show a small decline over the projection period, from 5.3 to 5.0 turkeys per square mile in the Southeast and from 6.6 to 6.5 turkeys in the South Central region (app. table 4.6). In the early decades of the projection period, turkey populations are

[1] The material in this chapter on forage, white-tailed deer, wild turkey, red-cockaded woodpecker, cold-water fish, and water has been taken from the following office reports: ''Regional Forage Response to Timber Management'' by Linda A. Joyce, ''Regional Wildlife Response to Timber Management'' by Curtis H. Flather, ''Regional Cold-Water Fish Response to Timber Management'' by Patricia A. Flebbe, and ''Regional Water Response to Timber Management'' by Stan Ursic. Copies of these office reports can be obtained from Linda A. Joyce, USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, 240 W. Prospect, Fort Collins, CO 80524.

even lower than the levels in 2030. After 2010, turkey populations increase slightly in the Southeast. They make a significant recovery in the South Central region in response to increased hardwood acreage in both older and younger stands.

Wild turkey have habitat requirements more specific than those for deer and closely tied to the hardwood management types. Although increases in intensive human-related land use undoubtedly contribute to the early decline in population, the general decrease in the area in upland hardwoods, young hardwoods, and older hardwood stands is probably the primary influence on turkey population levels.

As with deer, wild turkey populations can be maintained and increased with more intensive management. Many practices and programs such as those that increase mast production, better enforcement of game laws, and increased technical assistance to private timberland owners on desirable management practices would benefit both deer and turkey. There are some additional things that can be done. For example, there are still some areas of suitable turkey habitat that need restocking. Creating openings in timberland will provide good brood habitat and increase summer food. Providing water sources in dry areas and taking action to reduce human disturbance in turkey habitat will also help. Maintaining hardwood stands, particularly along streams and on bottomlands, would also greatly benefit turkey.

Red-Cockaded Woodpecker—The red-cockaded woodpecker follows the trends for deer and turkey. The number of counties supporting red-cockaded woodpecker colonies is projected to drop from 114 to 35 in the Southeast and from 56 to 48 in the South Central region (app. table 4.6). The declines take place in the early part of the projection period.

The red-cockaded woodpecker has highly specialized habitat needs. It requires old-growth pine stands for nesting and survival. The decline reflects the rapid conversion of old-growth natural pine stands on private ownerships to planted pine and younger age classes.

Some of the forest industry timberlands in the South currently have suitable woodpecker habitat; in some areas, such as in Arkansas, most of the known colonies are on industry lands. Over the projection period, however, it does not appear likely that many old-growth pine stands of sufficient size to support colonies will be maintained on private lands. Thus, the relative stability in the number of counties that support active colonies in the latter part of the projection period reflects the continued retention of old-growth pine stands on Federal ownerships, especially those on the national forests. Some planted pine rotations on the national forests run 80 years.

Maintaining red-cockaded woodpecker populations requires long pine rotations, retention of mature stands for nesting, control of midstory hardwood encroachment in colony sites, and maintenance of adequate foraging habitat. Population augmentation and transplanting birds between populations would also be required to maintain genetic diversity. Such measures would be costly for private owners. It seems clear that the preservation of viable populations of the red-cockaded woodpecker will depend on the management of the Federal ownerships.

Trout—As with the wildlife species analyzed, trout populations drop over the projection years (app. table 4.6). In the cold-water stream area of the Southeast[2], they fall from 171 trout per acre of stream in 1985 to 119 trout in 2030. This drop largely reflects a decrease in the older age classes of hardwoods (over 50 years) and increases in the area of intensive human-related use. The highest trout density is associated with a high proportion of older hardwoods; the lowest is associated with land uses other than timberland. Implicit in these relationships are factors such as cold water temperatures, in-stream cover, and shading that are positive for trout with old hardwoods and negative for trout near intensive human-related uses.

Actions to maintain and increase cold-water fish populations include the proper location and maintenance of roads, leaving protective vegetation along streams, and locating development activities outside riparian zones. Habitat improvement in streams can also contribute, especially by improving undesirable conditions caused by past land use practices.

Water Quantity—Annual water yields or runoff increase by 0.5 inch or 3 percent in the Southeast and by 0.6 inch or 4 percent in the South Central region over the projection years (app. table 4.6). Most of the increase in the Southeast takes place by 2000, most of that in the South Central region, after 2000.

The increase in water yields reflects land use changes, especially the increase in the area of urban land and the decrease in timberland. The timing of the regional increase

[2] The analysis was confined to the mountainous areas of western Virginia, North Carolina, South Carolina, and Georgia, where streams with suitable habitat for cold-water fish exist. No suitable data on cold-water fish are currently available for States in the South Central region.

in water yields reflects the timing of the regional land use changes.

Further shifts from timberland to urban use, and to crop and pasture use, would result in additional increases in water runoff. However, the South is experiencing rapid declines in groundwater levels due to withdrawals for irrigation and domestic water supply. Such shifts would probably result in less groundwater recharge.

Resource, Economic, and Environmental Implications of Other Futures

The preceding discussion has been concerned with one future based on the complex set of assumptions about determinants of timber demands and supplies described in chapter 3. Future changes in these determinants may be quite different from what has been assumed. They can also be changed by design—by legislation or administrative action to alter the policies and programs that affect either demand or supply.

It is obviously impractical to deal in any comprehensive way with all the possible uncertainties and policy and program changes. The executive group guiding this study devoted substantial time to discussing the kinds of futures that should be analyzed. The group was particularly concerned about legislation currently being considered, farm and forestry programs under discussion at Federal and State levels, and some of the major uncertainties associated with the demand and supply projections. After extended discussion, the executive group selected the following futures for analysis:

1. The future as described by the basic assumptions and other specified and implied assumptions underlying the projections in chapter 3.

2. Improved processing efficiency. The future as described by the assumptions in chapter 3, modified by increasing softwood lumber and plywood yields by 25 percent instead of the 10-percent increase assumed in the base projection. The increase in yields are staged in the progression 9, 7, 5, 3, and 1 percent per decade.

3. High exports of timber products. The future as described by the assumptions in chapter 3, modified by increasing the projected exports of lumber, plywood, and pulpwood (including pulpwood and the pulpwood equivalent of pulp, paper, and board) by 20 percent in 1990, 40 percent in 2000, 60 percent in 2010, 80 percent in 2020, and 100 percent in 2030.

4. High imports of timber products. The future as described by the assumptions in chapter 3, modified by increasing the projected imports of plywood, pulpwood (including pulpwood and the pulpwood equivalent of pulp, paper, and board), and hardwood lumber and logs by 20 percent in 1990, 40 percent in 2000, 60 percent in 2010, 80 percent in 2020, and 100 percent in 2030.

5. Reduced timberland area. The future as described by the assumptions in chapter 3, modified by reducing the projected area in timberland in the South by 2 million acres in 1990, 5 million acres in 2000, and 11 million acres in 2030.

6. Reduced timber growth. The future as described by the assumptions in chapter 3, modified by reducing by 25 percent the net annual growth on pine plantations, natural pine, and mixed pine–hardwood stands shown in the empirical yield tables used in developing the base projections.

7. Reduced national forest harvest. The future as described by the assumptions in chapter 3, modified by reducing timber harvests on the national forests to 8.1 billion board feet in 1990 and maintaining this level through 2030.

8. Natural regeneration on marginal cropland and pasture. The future as described by the assumptions in chapter 3, modified by assuming that all marginal cropland and pasture in the South would naturally revert to timberland by 2000 (70 percent natural pine, 30 percent hardwoods in the Southeast; 40 percent natural pine, 60 percent hardwoods in the South Central).

9. Planted pine on marginal cropland and pasture. The future as described by the assumptions in chapter 3, modified by assuming that all the marginal cropland and pasture in the South would be planted to pine.

10. Economic opportunities on private timberlands. The future as described by the assumptions in chapter 3, modified by assuming the utilization of all the economic opportunities (except those involving intermediate stand treatment and those not involving area changes in management types) for increasing timber supplies on timberland in private ownerships that yield 4 percent or more net of inflation or deflation.

11. All economic opportunities on private land. The future as described by the assumptions in chapter 3, modified by assuming that (1) all the economic opportunities (except those involving intermediate stand treatment and those not involving area change in management types) for increasing timber supplies on timberland in private ownership that would yield 4 percent or more net of inflation or deflation would be utilized, and (2) all the marginal cropland and pasture would be planted to pine.

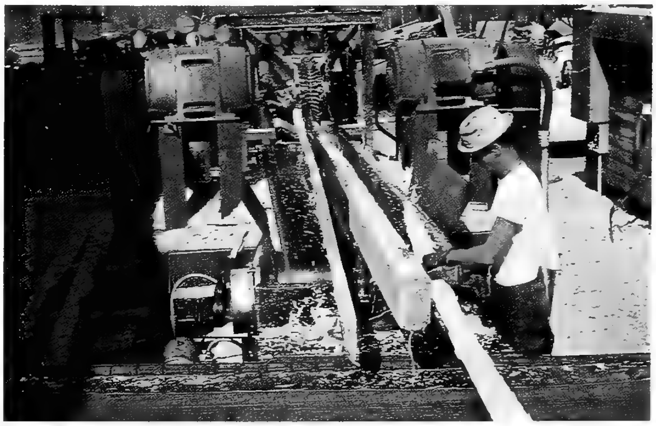
12. Increased management intensity on forest industry timberlands in the Douglas-fir region. The future as described by the assumptions in chapter 3, modified by assuming that all the economic opportunities to increase timber supplies on forest industry timberlands in the Douglas-fir region would be utilized.

The implications of each of these selected futures are discussed below. The discussion is directed at the important differences in the resource changes and economic and environmental effects from those shown in the base projections. Most of the data on resource changes are shown only for the private ownerships—forest industry and other private. Most of the selected futures would not have significant impacts on the resources in national forests and other public ownerships.

Improved Processing Efficiency

The limited historical data that are available show that lumber and plywood outputs per cubic unit of log input have been increasing in most major producing sections. Past assessments and the base simulation in this study have assumed that such improvements in utilization would in the future increase at 2 percent per decade. Noting that rising stumpage costs will provide an incentive for more efficient utilization and that the technology is currently available, some observers argue that recovery improvement in the future should average closer to 5 percent per decade.

In response to such views, it was assumed for this simulation that the increase in softwood lumber and plywood yields would be 25 percent over the projection period, rather than the 10 percent increase included in the base



Improvements in utilization that increase the output of lumber and plywood per unit of log input can have a substantial impact on the economy. They can reduce the demand on domestic timber resources, constrain price increases, and increase both the production and consumption of lumber and plywood.

simulation. Rates of increase per decade decline over the projection period in the progression 9, 7, 5, 3, and 1 percent per decade. This declining trend presumes that rising wood costs in the immediate future and current availability of substantially more efficient technology lead to rapid adoption of new technology in the near term with a gradual slowing as cost pressures are reduced. Changes in rates of recovery improvement were made for all regions, including Canada.

Under this simulation there is very little change from the base projections in softwood harvest levels (timber supplies) and timber inventories on private ownerships in the South (app. table 4.1). However, softwood inventories are considerably higher in the Pacific Northwest (app. table 4.2), where a higher proportion of the softwood harvest is used for lumber and plywood.

Although harvests on private ownerships are below the base because of the increased product yields, production of softwood lumber and softwood plywood is up in most producing sections, particularly in the later projection years. Consumption of softwood roundwood pulpwood is also higher in the South because improved product recovery reduces the volume of byproducts from mill operations available to pulp mills.

Lower harvests result in a substantial reduction in softwood stumpage and softwood lumber prices relative to base projections in the South and other sections (fig. 4.7). Improvements in processing efficiency affect employment and wages and salaries in the South's lumber and wood products industry (app. table 4.5). Both are lower by about 13 percent by 2030. Most of the other measures of economic and environmental change, however, are close to the base projections.

This simulation did not include improvements in the efficiency of pulp manufacture, such as increasing use of hardwoods to replace softwoods, beyond the assumptions used in the base projections. The base projections include nearly the level of hardwood-for-softwood substitution in pulping that Haygreen and others (1986) identified in their study of how technologies could either increase the efficiency of wood use or substitute cheaper hardwoods for softwoods. In the South, for example, this assumption in the base simulation is that pulp furnish will shift from the current 24 percent hardwood to 35 percent hardwood by 2030.

The effects of industry adoption of the technologies identified by Haygreen and others (1986) have been simulated using the Timber Assessment Market Model and described by Skog and Haynes (1987). Skog and Haynes found that softwood harvest would be reduced by only 15 percent if the pulping technologies were adopted.

This simulation of the effects of improved processing efficiency is of considerable importance from the policy and program standpoint. Programs can be developed to: (1) increase the useful life of wood products by preservative treatments, improving designs of new structures, and renovating and maintaining existing structures rather than replacing them; (2) improve efficiency in harvesting, milling, construction, and manufacturing; and (3) utilize unused wood materials such as logging residues; treetops and limbs; rough, rotten, and salvable dead trees; trees in urban areas, fencerows, and low-productivity forest areas; and urban wood wastes. By extending timber supplies and reducing demand on timber resources, such programs clearly have the potential to constrain future increases in stumpage and timber product prices.

High Exports of Timber Products

In recent years domestic producers have made organized efforts to expand exports of lumber, plywood, pulp and paper, and other timber products to European and Asian countries. Potential in these markets is generally thought to be great, perhaps twice current export levels. At the same time, it is generally recognized that the conditions which would induce expansion of lumber and plywood trade will likely lead to a corresponding reduction in U.S. log exports. Realizing the potential for expanded trade also depends on the willingness of domestic firms to enter new market areas, elimination of currently restrictive trade barriers in importing countries, and the ability of U.S. producers to capture a larger export market share in the face of price and other kinds of competition from other world suppliers.

This simulation assumes that in the United States, conditions have developed that are conducive to, and supportive of, expanded export trade. These include government actions to facilitate the organizational, information, financial, and transportation aspects of trade comparable to those available for other products (notably agriculture). Another condition is the continued effort to eliminate trade barriers.

A doubling of exports of the major timber products (except softwood logs) over the projection years has the obvious effect of increasing demands and harvests (timber supplies) over the base projections for softwoods and

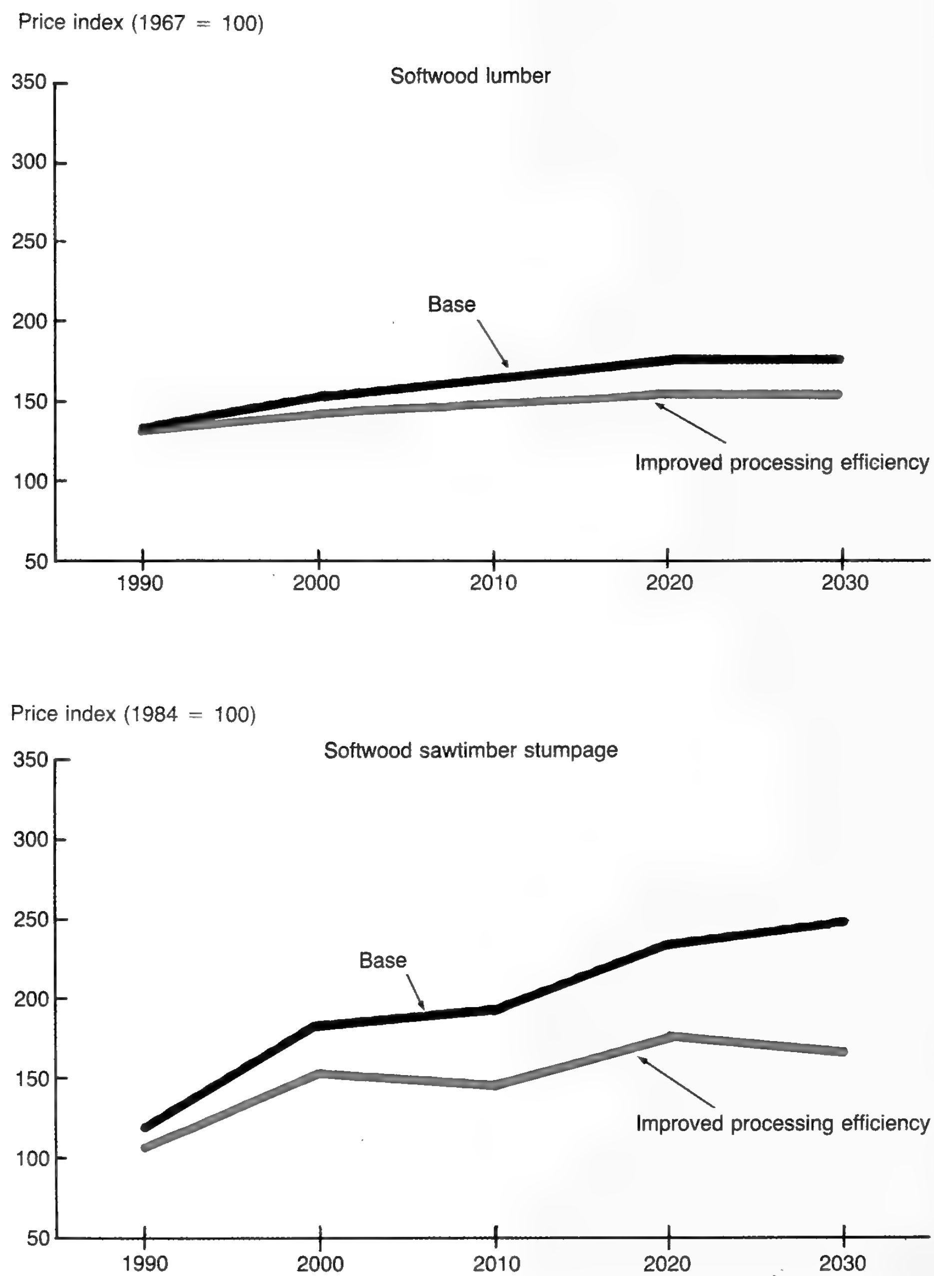


Figure 4.7—Projections of softwood lumber and sawtimber stumpage price indexes in the South, with and without additional improvements in processing efficiency

Changes in international trade in timber products can greatly influence the timber situation in the South and the Nation. Doubling exports of the major timber products, for example, would substantially increase the demand on timber resources in the South, chiefly for pulpwood, and timber inventories would be reduced. Stumpage prices would rise proportionately.

hardwoods. Softwood log exports were assumed to be replaced by exports of other products. The impacts vary by product, however, because doubled exports of some products are small in comparison to production. Impacts also vary by geographic section because of the location of export markets and comparative cost differences. For example, production of softwood lumber and plywood drops below the base projections in the South but rises substantially above them in the Pacific Northwest. Consumption of softwood roundwood pulpwood shows the opposite pattern, much above the base in the South and below it in the Pacific Northwest.

There are also sectional differences in softwood inventory changes; those in the South are considerably lower and those in the Pacific Northwest considerably higher than the base numbers. Hardwood inventories drop below the base projections in both regions of the South and of the North.

Softwood stumpage prices in the South, particularly pulpwood prices, are higher than those in the base, but lumber prices are about the same. This reflects the volumes involved. There are large increases in pulpwood consumption while doubled lumber exports are still small relative to total lumber production. Hardwood sawtimber stumpage prices are also above the base. There is little change, however, in hardwood lumber production and prices.

The largest impact from a doubling of exports is on the pulp and paper industry. By 2030, for example, roundwood pulpwood consumption in the South is nearly a billion cubic feet above the base (fig. 4.8). There are also substantial increases, mostly from hardwoods, in the northern regions.

As a result of the increase in pulpwood consumption, employment and wages and salaries are higher than the base in the pulp and paper products industry in the South. However, about one-fourth of the amount of the increases is offset by decreases in the lumber and wood products industry. Most of the other measures of economic and environmental changes are about the same as the base except State and local government revenues. By 2030 these are about $6.7 billion higher with the largest part of the increase in the Southeast, where most of the expansion in the pulp industry takes place.

High Imports of Timber Products

As with exports, there is a potential to increase greatly the imports of most timber products, specifically hardwood lumber and logs, plywood, and pulpwood, including the pulpwood equivalent of pulp, paper, and board. The world still has huge areas of tropical hardwood forests. Although concern is growing about the depletion of these forests and the capability of the countries with these resources to manage them in ways that sustain productivity, these forests are expected to supply increasing amounts of hardwood timber and products to world markets for several decades. Moreover, U.S. imports of hardwood lumber and logs and hardwood plywood—in terms of cubic volume of roundwood— are small. Doubling current imports would not increase world demands by very much.

There is an even greater potential for imports of pulpwood, including woodpulp and paper. Large areas in tropical and subtropical regions are suitable and available for forest plantations. Very high rates of net annual growth per acre are being achieved in these regions with species, such as pine and eucalyptus, that are desirable for pulping.

So far the area in plantations in these regions is small in proportion to that needed to supply much of the world's pulp and paper markets. There are also present and potential problems such as the maintenance of site productivity, mortality losses from insects and disease, the lack of transportation systems, and growing demands within the tropical and subtropical regions that may limit or constrain the supplies of wood from plantations. Nonetheless, the poten-

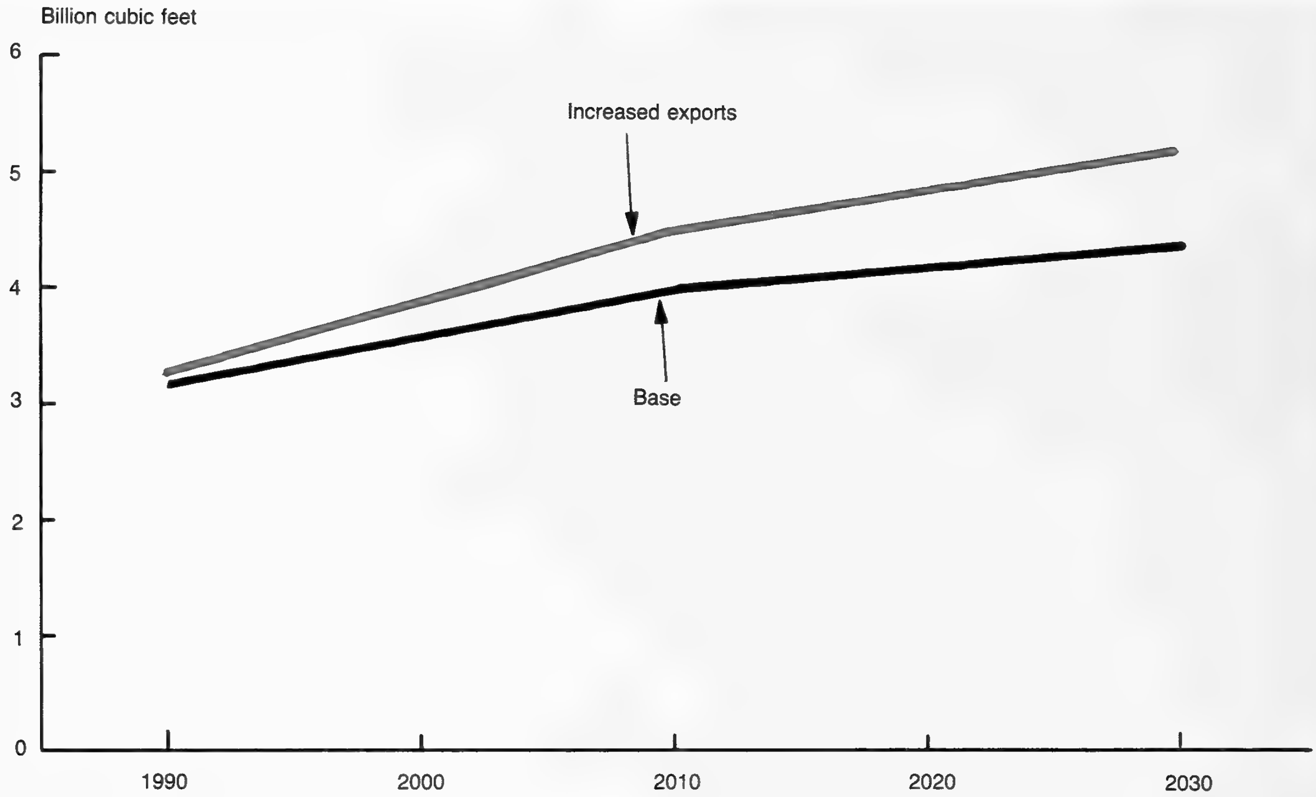


Figure 4.8—Projections of roundwood pulpwood consumption in the South, with and without increased exports of timber products

tial is there to double U.S. imports of pulpwood, including pulp and paper, and this prospect is of some concern to the pulp industry and forest owners in the South.

In contrast to a doubling of exports, a doubling of imports reduces demands on domestic resources. Both softwood and hardwood timber harvests (supplies) drop below the base projections in most timber-producing sections. On the other hand, inventories rise and are above the base numbers in most sections and regions. The largest increase is in the South—softwood timber inventories in 2030 are some 16 percent above the base.

The lower harvests and higher inventories largely reflect changes in the consumption of pulpwood roundwood in the South. By 2030, softwood roundwood consumption is down by nearly 700 million cubic feet and that of hardwoods, by close to 600 million. As a result there are also substantially lower softwood pulpwood stumpage prices. In fact, they stay below or close to the 1984 levels in both southern regions until near the end of the projection period. Prices for softwood and hardwood sawtimber stumpage are also below the base numbers, but the difference is much smaller than for pulpwood.

In response to lower sawtimber stumpage prices, and somewhat lower lumber prices, there is some increase in softwood lumber production in the South. In most other lumber-producing sections, there is little change from the base. Softwood plywood production is also above the base in the South but about the same in the other producing regions. Softwood lumber imports are reduced below the base projections.

Employment in the lumber and wood products industry is above the base levels, a response to the higher lumber production. But this increase is more than offset by declines in the pulp and paper industry, where employment is 19 percent below the base projections in 2030 because of the increased imports of pulp and paper (fig. 4.9). Wages

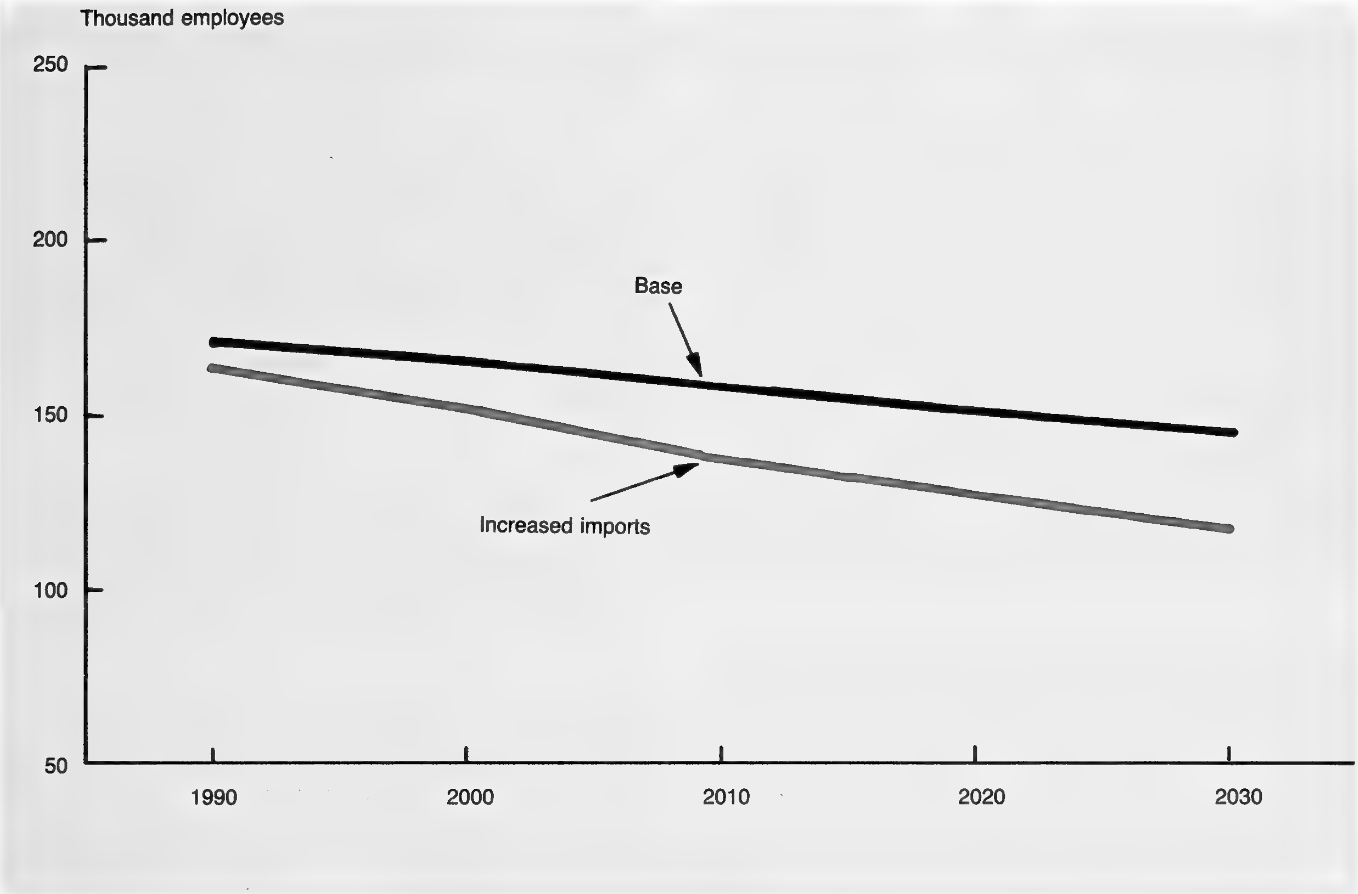


Figure 4.9—Projections of employment in the pulp and paper products industry in the South, with and without increased imports of timber products

and salaries in the pulp and paper industry show the same percentage decrease.

Total State and local government revenues are nearly $9 billion below the base by 2030, reflecting the lower level of pulp production in both the Southeast and South Central regions. Investments in the lumber and wood products industry show a small increase; those in the pulp and paper products industry, a small decrease.

Reduced Timberland Area

As described in chapter 3, there is always major uncertainty associated with land-use changes. At the present time the outlook for the cropland that will be needed to meet domestic and export demands for farm products seems especially uncertain. There are two major causes of this: (1) future trends in crop yields, and (2) export demands.

In the base projections, it was assumed that the cropland area in the Southern States (excluding western Texas and

Any further clearing of timberland in the South would in time reduce net annual timber growth and inventories and increase prices for stumpage and finished products. However, if this kind of change occurs gradually, most of the impacts would be beyond 2030, the end of the projection period in this study.

Oklahoma) would remain close to the present level, about 53 million acres. According to a recent authoritative study of cropland needs (Joint Council on Food and Agricultural Sciences 1984), cropland needs nationwide may rise by 50 million acres by 2020. This estimate is the intermediate projection of that study. It was based on long-term trends adjusted judgmentally to conform with what was considered to be plausible increases in yields. The South's share of such an increase in cropland could add about 16 million acres to the cropland acreage assumed in the base projections.

In this simulation, it was assumed that cropland needs in the South would rise in line with the Joint Council's projection and that about 5 million acres would come from pasture and idle land. It was further assumed that 11 million acres of cropland would come from the 23 million acres of timberland in the South that have high or medium potential for conversion to cropland (table 3.11). The conversion to cropland was spread evenly over the next 35 years.

Under this simulation, there are reductions in net annual growth and inventories from the base levels in the last decades of the projection period. For softwoods the decreases are not large enough to have much impact on stumpage prices. For hardwoods, however, there is a significant effect over time. The 2030 price of hardwood sawtimber stumpage in the Southeast is 18 percent above the base.

The relatively small impact on the timber resource situation from this simulation largely reflects the timing of the assumed reductions in area. The changes in the first decades are too small to show up in a signficant way in net annual growth and inventory. In the latter part of the projection period, there are significant reductions in both net annual growth and inventories. The biggest impacts are on hardwoods. In the decades immediately beyond 2030, this future would show large impacts on both softwoods and hardwoods.

The reduction in inventories over the projection years is not large enough to have much impact on the output of products, or on the associated employment, wages and salaries, and investments in plants and equipment. There are substantial reductions in State and local government revenues from the timberland and timber base. Presumably, however, these reductions would be offset, perhaps more than offset, by the revenues from the land in other uses.

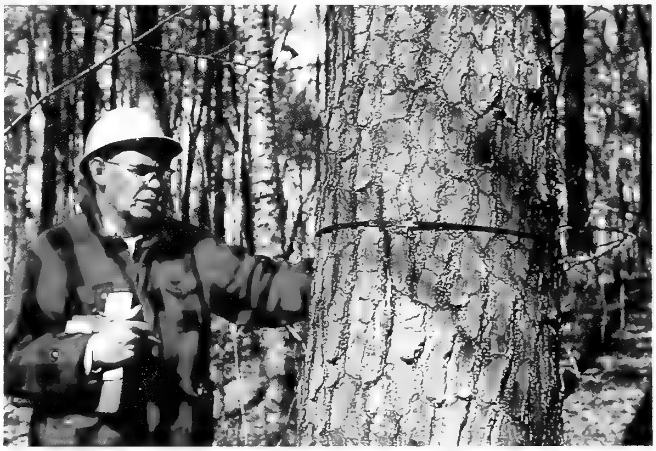
The reduction in timberland area does have significant impacts on forage, wildlife, and fish and water (app. table 4.6). Forage production on timberland declines in both regions from the base levels. Deer density shows different trends. In the Southeast, the increased fragmentation of the timberland base results in more-favorable habitat conditions and higher deer densities. In the South Central region, however, there are less-favorable conditions and deer populations are below those in the base projections.

The increase in cropland and the reduction in hardwood area result in slightly reduced densities for turkey in the Southeast. Populations in the South Central region, however, are not significantly different. The number of counties with red-cockaded woodpecker colonies in the Southeast are about the same as in the base. In the South Central region, there is a further drop, a response to the additional loss of area in the natural pine type.

Water quantity in both regions is above the base because of the increased cropland area—runoff is greater on cropland than on timberland. Trout density is substantially above the base, in part because of the increase in water quantity. It also reflects changes in the age distribution of timber stands.

Reduced Timber Growth

In recent years, measured declines in the rates of pine radial growth in parts of the South have attracted serious



Reductions in radial growth of pine of 20 to 30 percent have been measured over large areas in the South. If these reductions continue and occur throughout the region, they would have major impacts. Inventories would be greatly reduced, and prices for stumpage and products would rise sharply. Employment and wages and salaries in the lumber and wood products industry would also be greatly reduced.

attention from foresters, timber owners, and other forestry interests. Data collected as a part of the forest survey have shown significant declines in the Piedmont and mountains of Georgia, South Carolina, North Carolina, and Virginia.

In these areas, average annual radial growth of pine determined from remeasurements of sample trees at breast height has averaged some 20 to 30 percent lower over the past 10 years than over the previous 10. Reexamination of older forest-survey data on rates of tree growth indicates that declines extend back even further than the past 10 years and also show up in parts of the Coastal Plain in earlier remeasurement periods. There have also been measured declines in radial growth in the South Central region.

The causes of these declines have not been determined. Possible contributing factors include changes in stand density and age, drought, the exhaustion of residual fertilizers in the old fields and pastures that regenerated to pine, increase in hardwood competition, and atmospheric deposition. The full geographic extent of the decline is also unknown at this time.

In the areas where the decline in growth has been measured, it is reflected in the yield functions used in projecting resource changes. But because the causes and full extent of the decline are still unknown, this simulation is the only way to deal with the possible effects of a Southwide decline in radial growth. In making the simulation, it was assumed that the net annual growth on pine plantations, natural pine, and mixed pine–hardwood stands shown in the empirical yield tables (app. tables 3.15–3.18) used in developing the base projections would be reduced by 25 percent.

This simulation does show major impacts on the resource situation in the South and the associated parts of the economy and environment. Softwood roundwood supplies, net annual growth, and inventories are reduced below the base projections and by substantial amounts. By 2030, softwood inventories are 31 billion cubic feet, or 35 percent below the base (fig. 4.10). There are also reductions in inventories in most other important softwood timber regions.

The drop in softwood timber inventories, and the associated intensification in competition for the smaller supplies,

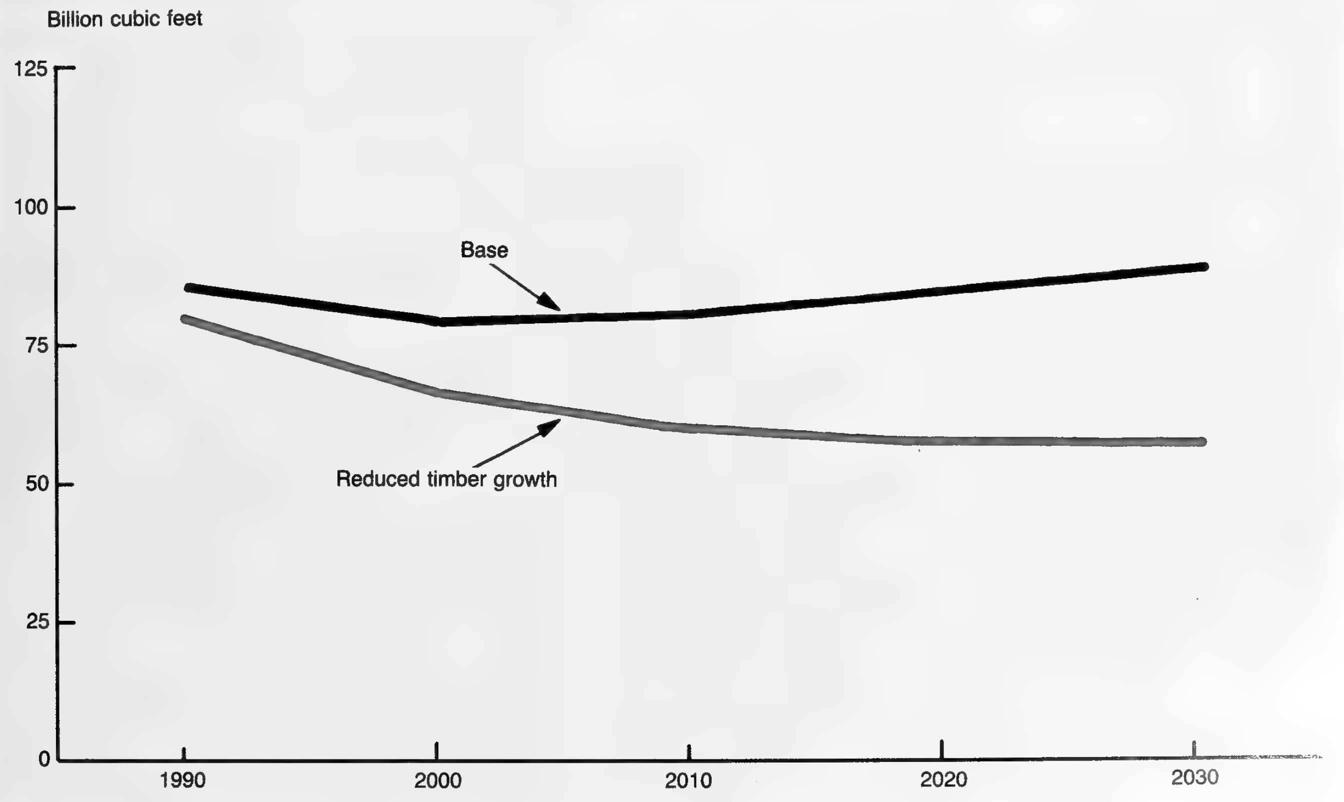


Figure 4.10—Projections of softwood inventories on private timberland in the South, with and without reduced timber growth

result in a large increase in softwood stumpage prices over the base projections, especially for pulpwood stumpage. In 2030, for example, prices for softwood pulpwood stumpage in the Southeast are 109 percent above the base (fig. 4.11). Softwood sawtimber stumpage prices in the region are 71 percent higher than the base. Softwood lumber prices are 19 percent above the base in 2030.

Higher stumpage prices in the South cause a sharp drop in softwood lumber and plywood production. Output in 2030 in the South is 6.0 billion board feet and 3.0 billion square feet, respectively, under the base. Round pulpwood consumption for both hardwoods and softwoods is above the base figures as roundwood replaces byproducts obtained from the manufacture of lumber and plywood.

Production of softwood lumber outside the South is up slightly from the base levels. Softwood lumber imports are much higher—by 4.0 billion board feet in 2030. Higher softwood stumpage prices also shift some demand to the hardwood resource in the South. Consumption of hardwood roundwood pulpwood is 300 million cubic feet above the base.

Reduced softwood timber harvests and the associated reductions in lumber and plywood production have a dramatic impact on employment and wages and salaries in the lumber and wood products industry (fig. 4.12). By 2030, they are only 66 percent of the base. In contrast, there is little change in employment in the pulp and paper products industry.

There are similar effects on investments in plants and equipment. Those in the lumber and wood products industry are much reduced, by 24 percent in 2030, while those in the pulp and paper industry are about the same. State and local government revenues are much reduced over the projection years, and by 2030 are over $12 billion below the base estimate.

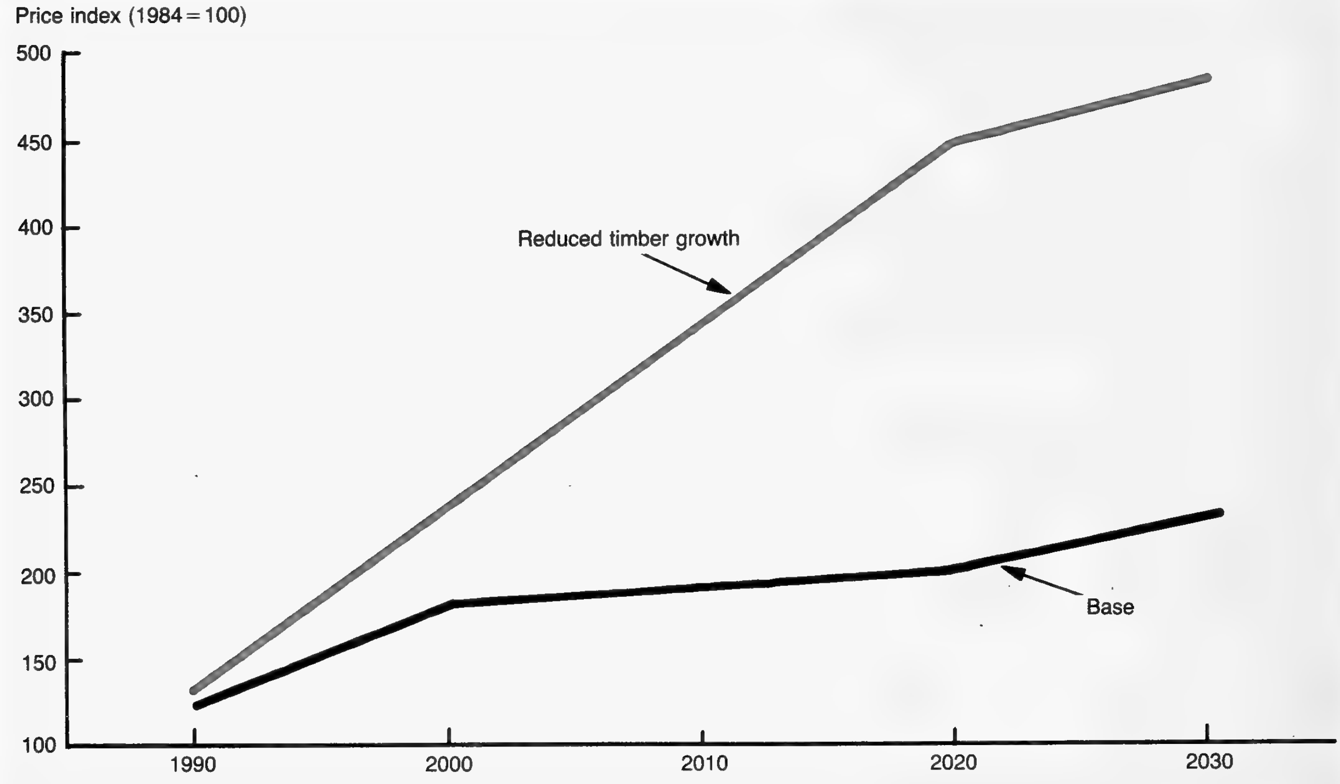


Figure 4.11—Projections of softwood pulpwood stumpage price indexes in the Southeast, with and without reduced timber growth

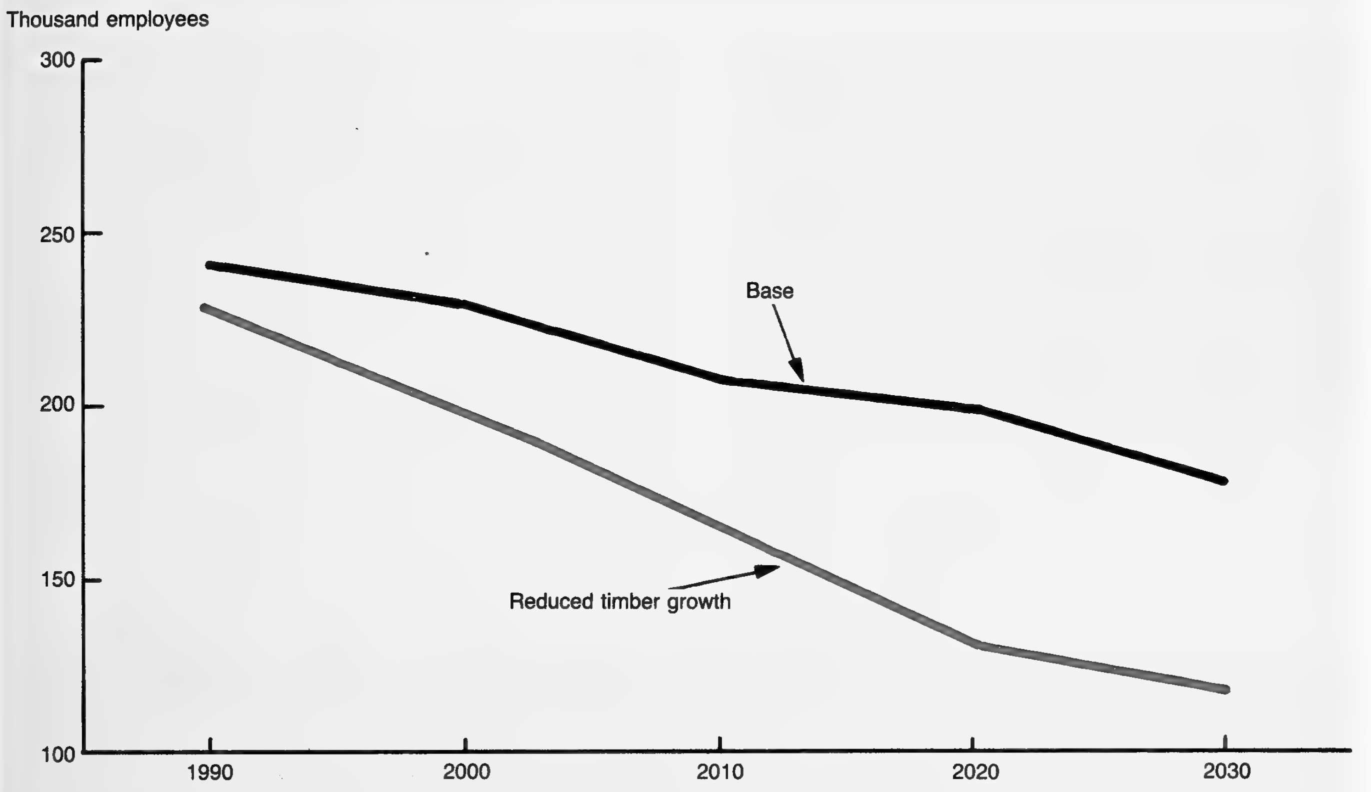


Figure 4.12—Projections of employment in the lumber and wood products industry in the South, with and without reduced timber growth

Forage production on timberland by 2030 is 21 percent higher than the base in the Southeast and 12 percent higher in the South Central region (app. table 6). The reduction in timber growth slows down closure, and the more open canopy results in increased forage production. Deer densities in the South Central region are also slightly above the base, a reflection of the increased acreages in the early forest successional stages. The impacts on deer in the Southeast and on turkey, red-cockaded woodpecker, and water quantity in both regions are small. The projections with reduced timber growth are about the same as those in the base.

Reduced National Forest Timber Harvest

In approximately the last two decades, it has become increasingly clear that the future of timber production on the national forests depends in part on (1) success in finding suitable ways to integrate timber production with other uses of forest land, and (2) the need to protect and maintain the forest environment, including endangered and threatened species. To many it seems likely that, as in the recent past, there will be increasing constraints on timber production.

This simulation responds to such expectations by reducing the base harvests from 10.1 billion board feet a year to 8.1 billion. This decrease in national forest harvest is partly offset by changes in harvests of other owners or in other regions. In regions where there are sufficient private timber supplies, decreases in national forest harvest lead to higher stumpage prices that, in turn, increase timber harvests from private lands. For example, the national forest harvest in the Pacific Northwest–Westside is reduced by 96 million cubic feet per year. Total annual harvest, however, is reduced by only 40 million cubic feet by 2000—private harvests having increased by 56 million cubic feet per year. In the Pacific Northwest's Westside, these offsetting changes can not be sustained after 2000 because of a worsening timber inventory situation. In other sections, such as the

Rocky Mountain, the reduction in national forest harvest is partly offset throughout the projection period.

Under this simulation, softwood inventories are down from the base numbers in the South and the western sections, with the biggest drop in the Pacific Northwest. These declines are reflected in intensified competition for the available timber and higher prices for softwood sawtimber stumpage. Those in the Pacific Northwest, for example, are 17 percent above the base by 2030 (fig. 4.13).

Softwood lumber prices are 4 percent higher in 2030 than in the base simulation. Because of the lumber price increases, total lumber consumption is down 2 percent and lumber imports from Canada are up 11 percent by 2030. The increase in lumber imports comes progressively after 2000 because domestic production is reduced as a consequence of the lower timber inventories and the associated higher prices. By 2030, domestic lumber production is 4 percent less than the base simulation. There are different impacts among regions. The largest impacts are in the western sections, particularly the Pacific Northwest with its large national forest resources.

There are no significant impacts on the hardwood resource associated with this simulation. Impacts on most other economic and environmental measures of change in the South, such as investments in plants and equipment, and wildlife and fish populations are also not large enough to be significant.

Natural Regeneration on Marginal Cropland and Pasture

As shown in tables 3.13 and 5.8, the South has about 22 million acres of marginal cropland and pasture, including highly erodible cropland, that would yield higher rates of return to the owners if planted to pine. If crop surpluses and the associated depressed farm conditions continue, this land could logically be expected to be among the first to be left

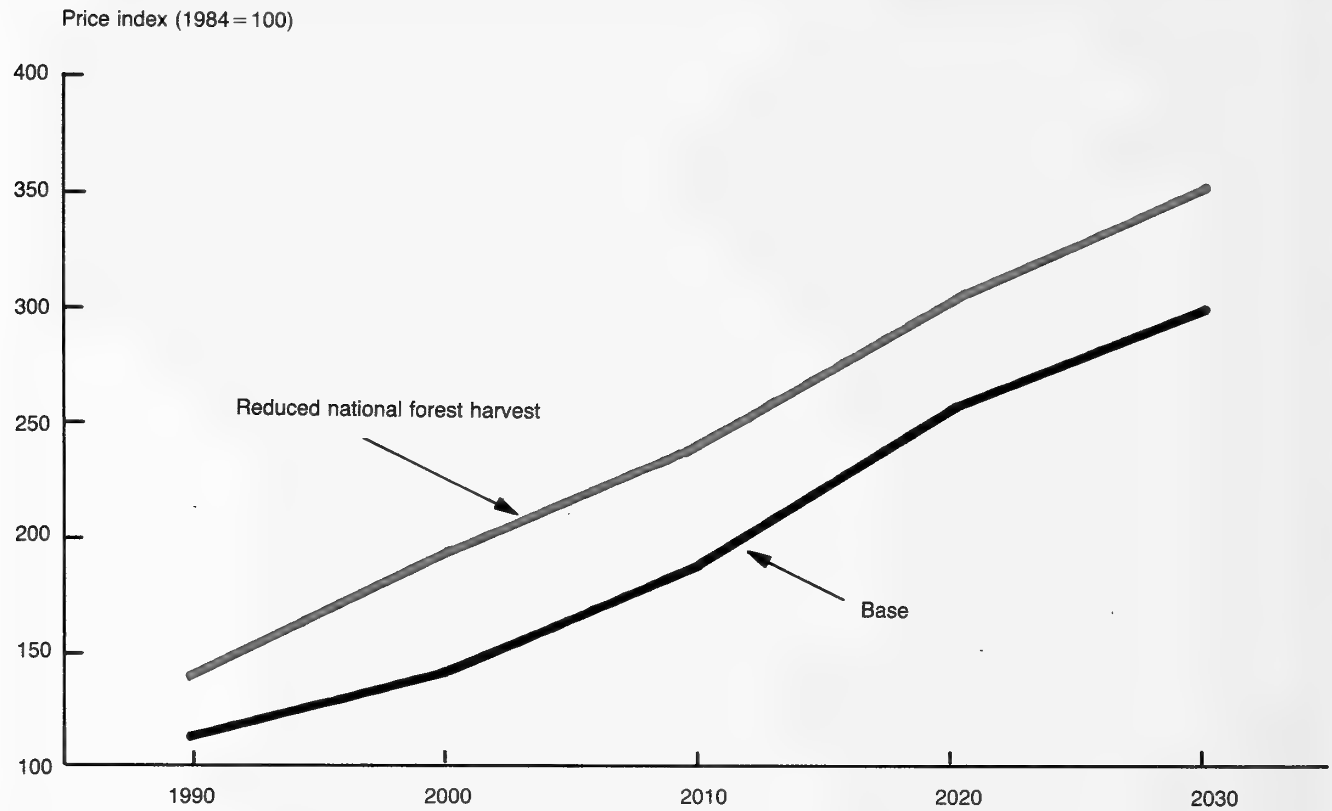


Figure 4.13—Projections of softwood sawtimber stumpage price indexes in the Pacific Northwest, with and without reduced national forest timber harvest

idle, unused for either crops or pasture. In the South, forests are the climax vegetation, and idle land will revert to forests, most of it to natural pine (70 percent) in the Southeast and to hardwoods (60 percent) in the South Central region. In this simulation, two-thirds of the natural reversion was assumed to take place over the next 15 years in equal annual increments, with the remaining one-third by 2010.

This natural reversion would have significant effects on the forest situation in the South, particularly on the hardwood picture. By 2030, hardwood net annual growth is 9 percent above and inventories are 17 percent above the base projections. Softwood net annual growth is slightly higher and inventories are 22 percent higher than the base levels. Most of the increases for both softwoods and hardwoods are on the other private ownerships.

As a result of the increased inventories and increased supplies, there are some declines in prices for sawtimber and pulpwood stumpage and some associated increases in lumber and plywood production and employment and wages and salaries in the lumber and wood products industry. In general, however, these effects and those on the other measures of resource and environmental change are relatively modest. This reflects in large part the timing of the establishment and stocking of natural stands. The full effects from the natural regeneration of stands would not take place within the projection period.

Planted Pine on Marginal Cropland and Pasture

In the previous simulation, it is assumed that nature in effect takes its course, that there are no forestry or conservation programs that would result in the establishment of pine plantations on marginal cropland and pasture. If depressed farm conditions continue, planting programs like the current Conservation Reserve Program may be expanded. If this is done, such programs are likely to be directed at the marginal cropland and pasture, including the highly erodible cropland (tables 3.13 and 5.8). The timing of the establishment of the plantations was assumed to be the same as that for natural pine.

The implementation of these opportunities would have large impacts on softwood timber resources and the timber economy of the South. By 2030, softwood timber inventories would be increased by 38 billion cubic feet or 43 percent of the base projections (fig. 4.14). Softwood timber supplies would be up by 5 percent, or about 0.3 billion cubic feet. In response to this rise, softwood sawtimber stumpage prices would go down by 22 percent, with even larger drops

Planting pine on economically marginal cropland and pasture and highly erodible cropland would substantially increase softwood net annual growth and inventories and reduce stumpage prices. Timber harvests would rise, and so would employment and wages and salaries in the forest industries.

in pulpwood stumpage prices. Softwood lumber prices are also down.

Because of increases in demand from the lower prices, production of softwood lumber and plywood in the South is up from the base, in the case of lumber by 1.5 billion board feet by 2030. There is an associated and substantial rise in consumption of softwood plant byproducts and a related drop in consumption of softwood roundwood pulpwood since more byproducts are available to substitute for roundwood. There is also an associated drop in softwood lumber imports, to 0.6 billion board feet below the base projection by 2030.

The increases in lumber and plywood production are reflected in higher levels of employment and wages and salaries in the lumber and wood products industry—10 percent. There are also increases in investments in plants and equipment in the lumber and wood products industry and increases in State and local government revenues.

Economic Opportunities on Timberland in Private Ownership

As described in detail in chapter 5, there are economic opportunities (defined as those that would yield 4 percent or more net of inflation or deflation) to increase timber supplies on 63 million acres of timberland in private ownership in the South (app. table 5.1). These opportunities, if

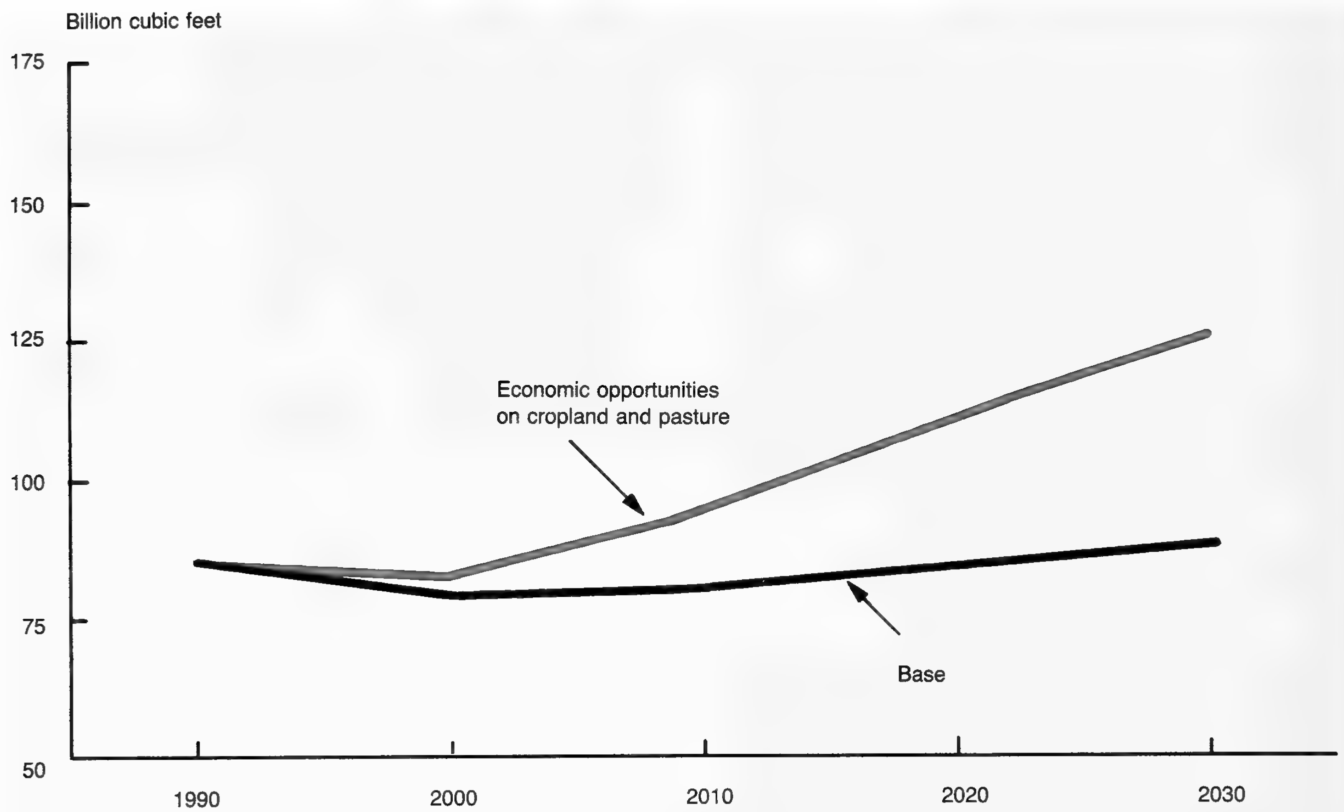


Figure 4.14—Projections of softwood inventories on private timberland in the South, with and without utilizing the economic opportunities on cropland and pasture

implemented, would raise net annual timber growth by 2.9 billion cubic feet, a 50-percent increase over current softwood growth. Most of these opportunities—50 million acres, 2.3 billion cubic feet—are on the other private ownerships.

These are the opportunities that exist now, and some of them have been implicitly included in the base projections. As described in chapter 3, it was assumed in making the base projections that there would be large increases in the area of pine plantations, including the conversion to pine of mixed pine–hardwood and upland hardwood stands, and increases in timber yields resulting from general management intensification. These management changes would, of course, be concentrated on the lands with the highest potential for economic returns—the timberlands identified in chapter 5.

The analysis of economic opportunities in chapter 5 was made with the base projections of stumpage prices. As the economic opportunities are utilized and timber inventories increased in this simulation, stumpage prices are lowered. Consequently, the economic opportunities are reduced. In the final equilibrium solution in this simulation, the potential increase in net annual growth on private timberland is much below the 2.9 billion cubic feet shown in appendix table 5.1. In addition, it was not practical to quantify the impacts of the intermediate stand treatments, and those not involving area change in management types, in the analytical systems used in projecting resource changes. This fact is important because it results in excluding about half of the area with economic opportunities to increase net annual growth. Finally, because of the timing of implementing the opportunities, the full increase in timber growth could not be realized by the end of the projection period.

Despite the limitations described above, the impacts of the simulation of the economic opportunities on private timberlands are substantial. Softwood timber supplies (harvests), net annual growth, and inventories are all higher than the

base projections—48 percent for inventories in 2030 (fig. 4.15). The increase in net annual growth is 1.3 billion cubic feet, less than half the total potential. The increases in inventories and in net annual growth are concentrated on the other private ownerships. This means that the bulk of the economic opportunities on forest industry lands have been implicitly included in the base projections.

As a result of the increase in inventories and harvests, stumpage prices for sawtimber and pulpwood in the South are reduced below the base and substantially so for pulpwood. In addition, prices for softwood sawtimber stumpage are lower in the western sections, especially in the Pacific Northwest. Softwood lumber prices are also down.

In response to the lower prices, softwood lumber production in the South rises and by 2030 is 2.5 billion board feet above the base. Softwood plywood production and consumption of softwood plant byproducts are also up, but consumption of softwood roundwood pulpwood is down slightly. Softwood lumber imports in 2030 are reduced by about 0.8 billion board feet from the base projections.

A substantial part of the economic opportunities involve the conversion of mixed pine–hardwood or hardwood stands to pine plantations or the establishment of pine plantations after harvest. As a result, hardwood inventories in the South are reduced from the base by over 30 billion cubic feet by 2030. Most of the decline is in the Southeast. There is an associated increase in hardwood stumpage prices, by 65 percent by 2030 in the Southeast. There is a related decrease in production of hardwood lumber and in consumption of hardwood pulpwood.

In response to increased production of softwood lumber and plywood, employment and wages and salaries in the lumber and wood products industry are 14 percent above the base levels. Investments in plants and equipment in the industry are also somewhat higher. In addition, State and lo-

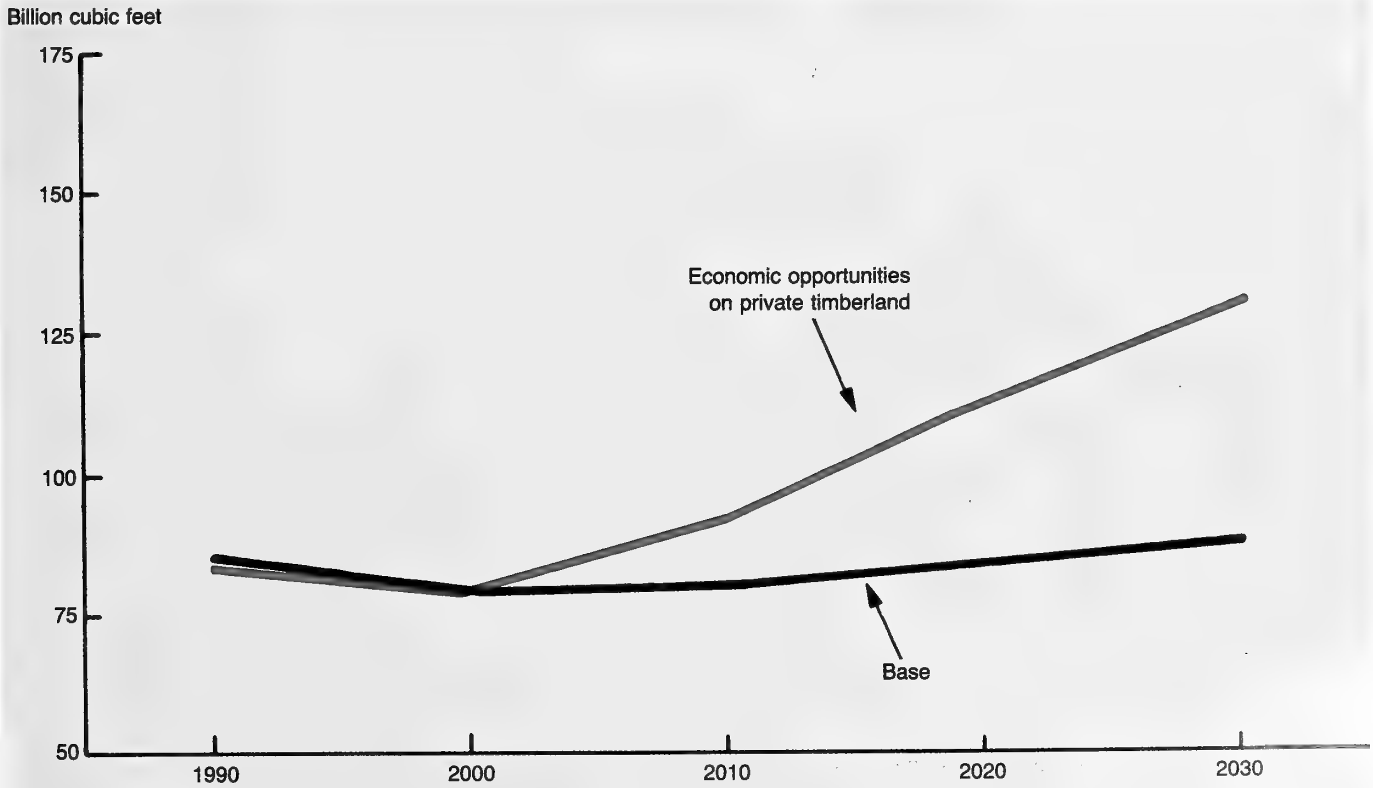


Figure 4.15—Projections of softwood inventories on private ownerships in the South, with and without utilizing the economic opportunities on private timberland

cal government revenues are up, by nearly $9 billion by 2030.

Forage production on timberland is about 15 percent above the base levels in both regions over the projection period. Turkey populations in the South Central region and trout numbers in the Southeast are up about 5 percent and 10 percent, respectively. Deer populations are also higher in the Southeast. The number of counties with red-cockaded woodpecker colonies, on the other hand, is down in both regions and particularly so in the South Central region, a response to the increased loss of area in natural pine. Water yields in the early part of the projection are above the base but fall below in the latter part of the period.

All Economic Opportunities on Private Lands

The two preceding simulations describe the impacts of implementing the economic opportunities to plant pine on marginal cropland and pasture and to increase timber supplies on private timberlands (excepting intermediate stand treatments and those not involving area change). In this simulation, both types of opportunities are combined. It seems reasonable to expect that policies and programs will be developed in the future that will lead at least in part to the utilization of both types of opportunities.

As might be expected, this simulation shows the largest impacts on the softwood timber resource and the associated parts of the economy of all the futures tested. For example, by 2030, the softwood inventory in the South is nearly doubled, going up from the base level of 89 billion cubic feet to 168 billion (fig. 4.16, app. tables 4.1 and 4.2). This rise reflects an increase in net annual growth, which goes up by a third over the base by 2030—from 6.7 to 8.9 billion cubic feet. All of the increases in net annual growth are on the other private ownerships. There is a small drop in growth on the forest industry ownerships.

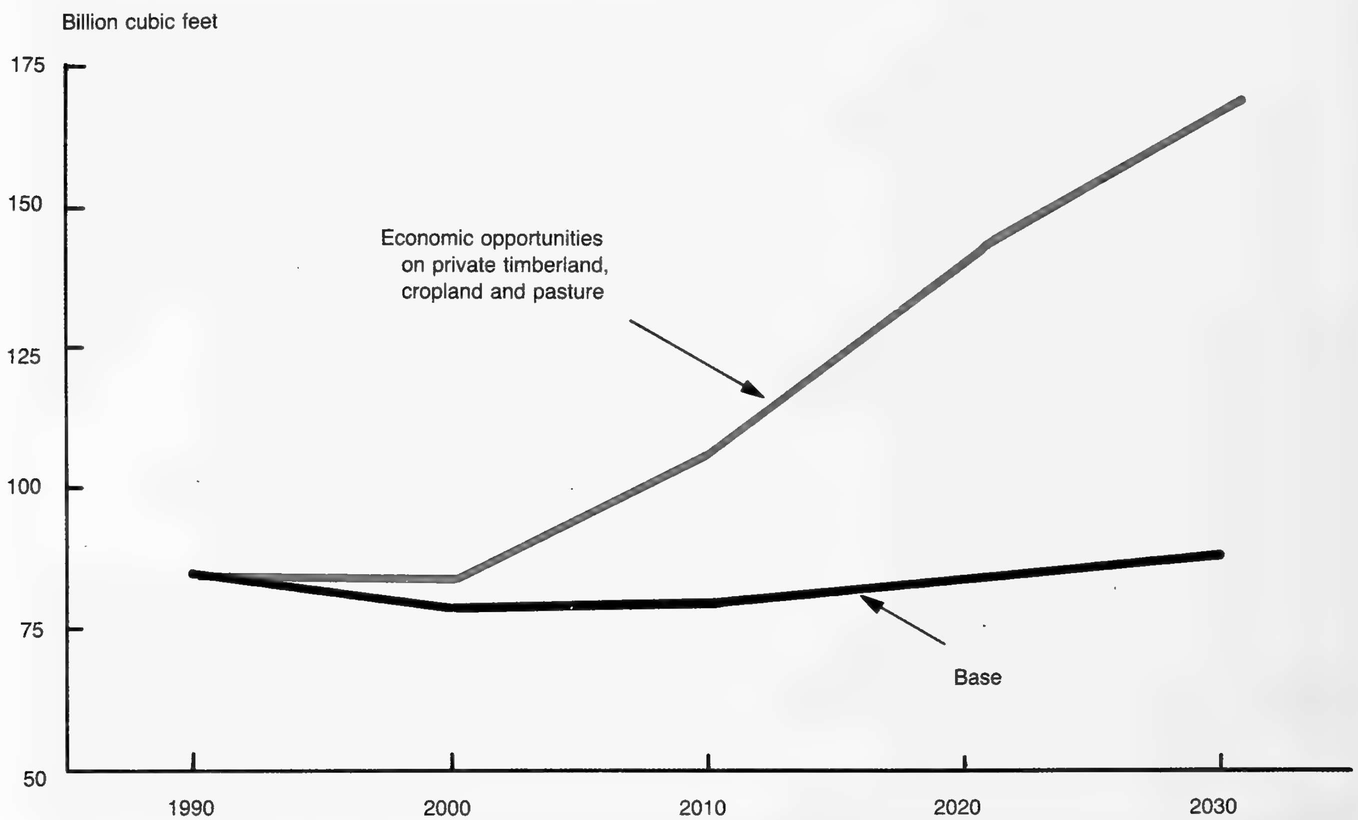


Figure 4.16—Projections of softwood inventories on private ownerships in the South, with and without utilizing the economic opportunities on private timberland, cropland and pasture

In response to the increases in net annual growth and inventories, timber supplies (harvests) on the other private ownerships in the South rise 31 percent over the base projections by 2030. This is partly offset by a drop in harvests on the forest industry ownerships. Total harvests on all private ownerships in the South go up by 9 percent, from 6.2 to 6.7 billion cubic feet in 2030.

This increase in harvests has large impacts on softwood sawtimber stumpage prices. They are lowered to about 36 percent below the base by 2030 (fig. 4.17). Softwood sawtimber stumpage prices in the other timber-producing regions are also reduced, especially in the Pacific Northwest, where they drop 26 percent below the base.

The lower softwood stumpage prices in the South are reflected in increased product outputs. Softwood lumber production rises from 18.5 billion to 22.1 billion board feet; softwood plywood production goes up from 11.2 billion to 13.1 billion square feet. These increases are partly offset by declines in other producing regions, particularly in the Pacific Northwest.

The rise in softwood lumber and plywood production results in an increase in the volume of plant byproducts available for use by the pulp industry. As a result of this and the higher levels of growth and inventories, softwood pulpwood stumpage prices are sharply reduced; those in 2030 in the Southeast, for example, are only a little over half those in the base (fig. 4.18). Pulpwood stumpage prices, however, have relatively little impact on pulpwood consumption in the South.

Lower prices for sawtimber stumpage are reflected in prices for softwood lumber. They are about 10 percent below the base in 2030. In response to those lower prices and increased levels of domestic production, softwood lumber imports are also reduced, by 1.4 billion board feet in 2030.

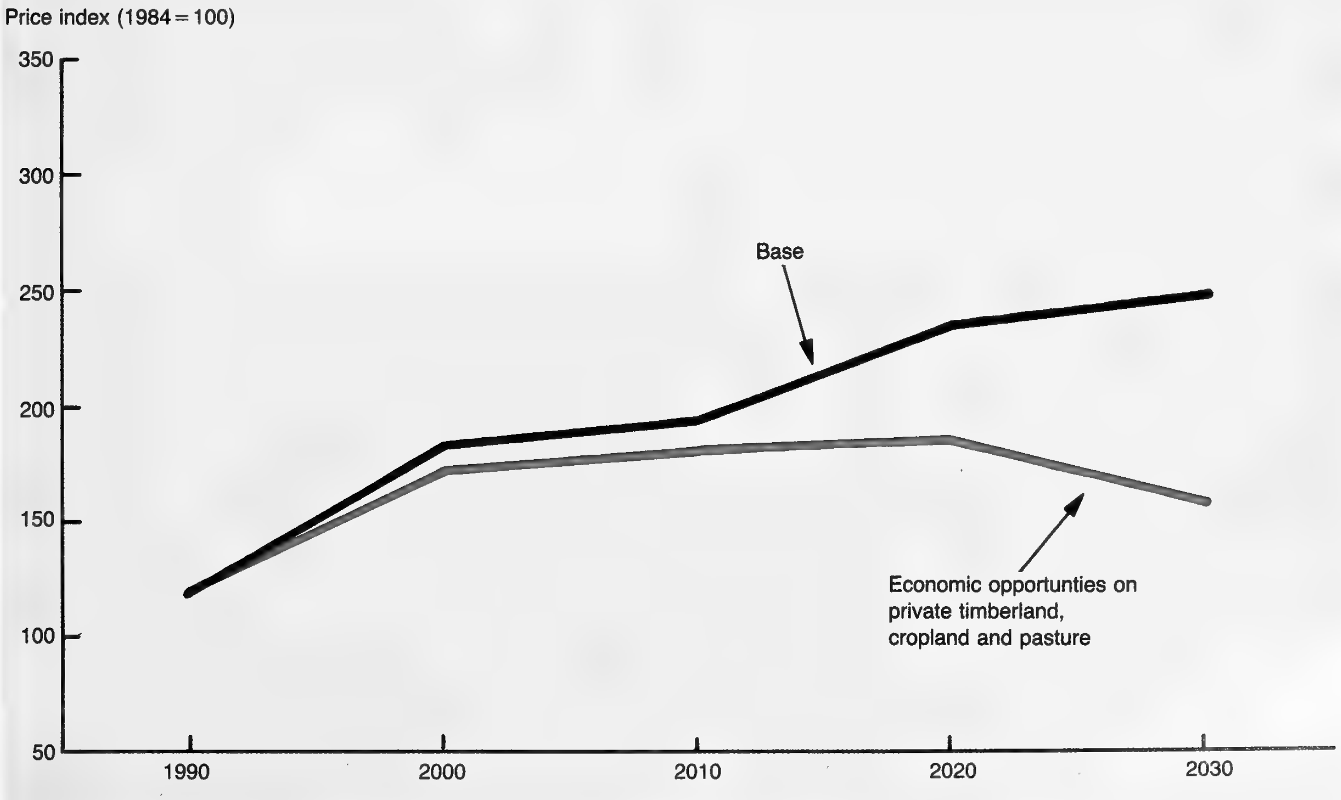


Figure 4.17—Projections of softwood sawtimber stumpage price indexes in the South, with and without utilizing the economic opportunities on private timberland, cropland, and pasture

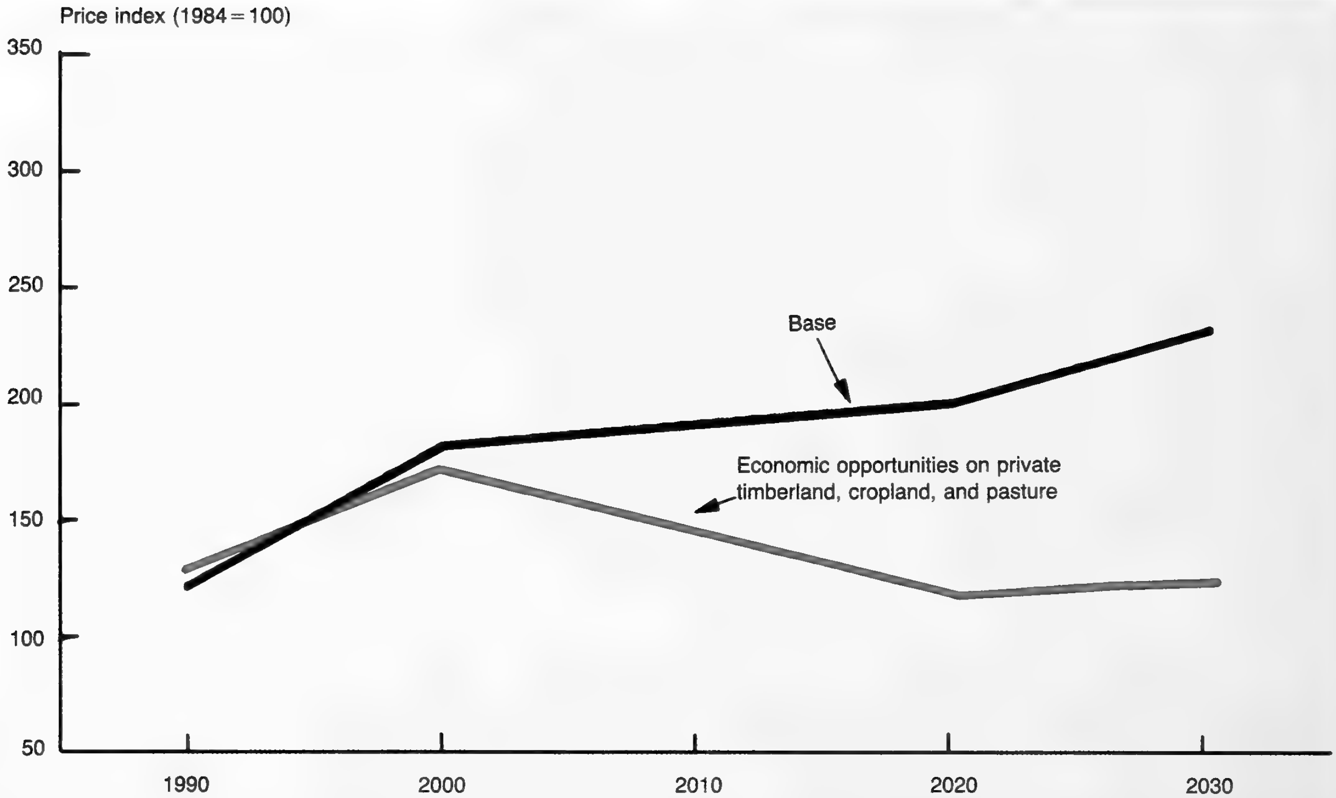


Figure 4.18—Projections of softwood pulpwood stumpage price indexes in the Southeast region, with and without utilizing the economic opportunities on private timberland, cropland, and pasture

Implementing the economic opportunities to increase timber supplies on timberland would involve the conversion of substantial areas of present mixed pine–hardwoods and upland hardwood stands to pine plantations. As a result, net annual hardwood growth and inventories are reduced. By 2030, for example, the hardwood inventories on private timberlands are 29 percent, or some 28 billion cubic feet, below the base projections.

The reduction in hardwood net annual growth and inventories causes fairly large increases in the prices of hardwood sawtimber stumpage. The increases are largest in the Southeast, where by the end of the projection period they are 62 percent above the base level. These higher stumpage prices in turn are reflected in higher prices for hardwood lumber and in lower lumber demand and production. Hardwood lumber production in 2030 is nearly a half billion board feet below the base projection. Hardwood pulpwood consumption, both roundwood and plant byproducts, is also reduced.

As a result of the increase in softwood lumber production, employment in 2030 in the lumber and wood products industry is up by 36,000 people over base employment. Wages and salaries in the industry show a proportional rise. Investments in plants and equipment are also up substantially. There is little change, however, in employment, wages and salaries, and investments in the pulp and paper products industry. By 2030, State and local government revenues are $38 billion above the base, with most of the increase in the Southeast.

Increased Management Intensity on Forest Industry Timberlands in the Douglas-fir Region

The above simulation shows the impacts that flow from utilizing the economic opportunities to increase net annual timber growth in the South. It also indicates that nearly all of the economic opportunities to establish pine plantations on industry lands are already in the base projections. This in turn reflects the fact that the experts who developed the

timber supply assumptions for the base projections expected that forest industries are likely to utilize the economic opportunities to increase net annual growth on their lands.

What is likely on the forest industry ownerships in the South is probably equally likely on the forest industry ownerships in the Douglas-fir region in Oregon and Washington, the Nation's other major timber-growing area. This simulation responds to that possibility: What would happen if forest industry owners took advantage of all the economic opportunities to increase timber growth on their lands in the Douglas-fir region?

This simulation does not show much impact on timber resources in the South or in timber-producing regions other than the Pacific Northwest. There, net annual softwood timber growth is increased by 64 percent by 2030 (fig. 4.19), and softwood inventories by 41 percent over the base projections.

Although the resource is not much affected in the South, softwood sawtimber and pulpwood stumpage prices decrease in the South Central region and increase slightly in the Southeast from the base. The biggest impact on softwood stumpage prices is in the Pacific Northwest. In 2030, those prices are 29 percent under the base.

This stumpage price decline affects softwood lumber production in the Pacific Northwest. In 2030, it is 1.9 billion board feet above the base level. Softwood lumber production is about the same as the base levels in the South and in the other producing sections. Softwood lumber prices are reduced but are only 5 percent below the base in 2030. Softwood lumber imports are also down, by about 1.2 billion board feet in 2030.

Because of the limited impacts on the timber resource in the South, there are no significant changes in the associated economic and environmental measures such as employ-

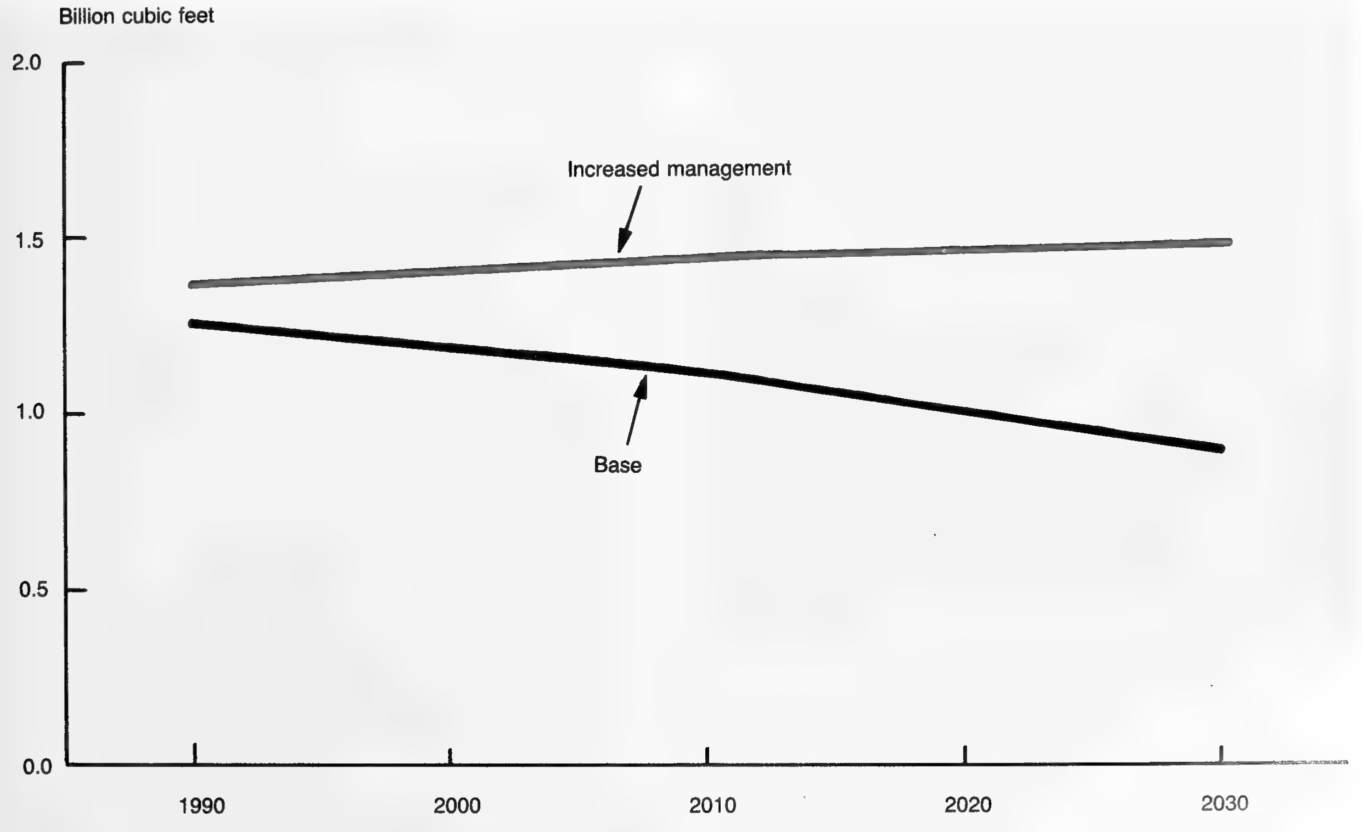


Figure 4.19—Projections of softwood net annual growth on private timberland in the Pacific Northwest, with and without increased management intensity on forest industry ownerships in the Douglas-fir region

ment and investments. They are all much the same as the base.

Highlights of the Implications of Resource Changes

The highlights of the implication analyses are:

1. The base projections of resource changes are the product of timberland management that is much more intensive than that practiced today. They reflect what would happen if there continues to be major progress in forestry in the South and continued expansion in the technical and financial assistance, protection, research, education, and management programs that have brought about the improved forestry situation in the South in the past.

Increases in timber harvests even with this more intensive management are too small to sustain present levels of employment in the forest industries. By 2000, employment is dropping; by 2030, employment will be some 21 percent, or 85,000 people, below 1984 levels. Wages and salaries also decline after 2000.

The drop in employment and income is of great economic importance in the South. The effects will be multiplied as they are spread through other sectors of the economy providing goods and services to forest industries. A loss of employment in the lumber and wood products industry would be multiplied by a factor of 2.3; a loss in the pulp and paper industry, by 2.6.

2. The analyses quantified the extensive interdependence among regions, ownerships, and time periods. Any change in the demand–supply situation in one region affects the demand–supply situation in all other regions. Likewise, any change on public or private lands will be offset in part by changes on other ownerships. Changes in the demand–supply situation in any one time period will affect the situation in following periods. As a result of this interdependence, a change, such as the recent imposition of a Canadian tax on softwood lumber exported to the United States, that may be desirable from one standpoint can have effects, such as higher domestic stumpage and product prices, that are undesirable from another standpoint.

3. Many of the alternative futures analyzed have little or limited impact on the timber resource and the associated parts of the economy and the environment. Some, however, do have significant impacts.

Improvements in processing efficiency can extend timber supplies and result in a substantial reduction in the rates of increase in softwood lumber and softwood stumpage prices.

The reductions in timberland area simulated in this analysis have relatively little impact on the timber resource and the associated parts of the economy and environment. However, this largely reflects the timing of the assumed reductions in area—the changes in the first decades are too small to show up in a significant way. In the last decades of the projection period, there are significant reductions in both net annual growth and inventories. In the decades beyond 2030, the assumed loss in timberland area (11 million acres) would have large impacts on the resource and the economy.

The 25-percent reduction in net annual growth on pine plantations, natural pine, and mixed pine–hardwood stands significantly affects the resource situation and the associated parts of the economy and environment. By 2030, softwood inventories are 31 billion cubic feet, or 35 percent, below the base projections. There are related and large increases in stumpage and lumber prices. These increases, in turn, cause a sharp drop in lumber and plywood production. Softwood lumber production in the South in 2030, for example, is reduced from 18.5 billion board feet to 12.5 billion. This has a dramatic impact on employment and wages and salaries in the lumber and wood products industry; by the year 2030, they are only 66 percent of the levels in the base projections.

The stumpage price increases have relatively little effect on the pulp and paper industry. Roundwood pulpwood consumption for both softwoods and hardwoods is above the base figures as roundwood replaces byproducts lost with the reduction in lumber and plywood production. There are very small increases in employment and wages and salaries.

There are opportunities to increase net annual timber growth by 2.1 billion cubic feet by planting pine on marginal cropland and pasture, including highly erodible land. Because of the timing of the planting, not all of this can be realized in the projection period. However, the impacts are substantial. By 2030, softwood timber inventories are 38 billion cubic feet, or 43 percent, above those in the base projections. Softwood lumber and plywood production in the South are also up; in the case of lumber, by 1.5 billion board feet, or 8 percent. Employment and wages and salaries would also be above the base but still show a big decline from present levels.

There are economic opportunities on private timberlands in the South to increase net annual timber growth by 2.9 billion cubic feet. If attained, this would increase current softwood growth by 50 percent. Only a part of these opportunities have been implicitly included in the base projections. Another part, those from intermediate stand treatments and those not involving changes in management type areas, have been excluded. In addition, because of the timing of implementing the opportunities, the full increase in timber growth could not be realized by the end of the projection period. Nonetheless, there are substantial impacts from this simulation on the resource and the economy.

Softwood timber harvests, net annual growth, and inventories are all higher than the base projections—42.6 billion cubic feet for inventories in 2030. A good part of the economic opportunities included involve conversion of mixed pine–hardwood stands or hardwood stands to pine plantations. Because of this, hardwood inventories are reduced below the base by 30 billion cubic feet by 2030.

Employment and wages and salaries in the lumber and wood products and the pulp and paper products industries are somewhat above the base levels. However, employment in both industries still declines by about 15 percent from 1984 through 2030.

A simulation of the combined effects of planting pine on marginal cropland and pasture and implementing the economic opportunities on private timberlands shows large impacts on the timber resource, stumpage prices, and employment. By 2030, the softwood inventory is nearly doubled, and net annual growth is increased by a third over the base projections. Softwood stumpage prices are sharply reduced, and production of softwood lumber and plywood is increased.

Implementing the economic opportunities to increase timber supplies on timberland would involve the conversion of large areas of mixed pine–hardwoods and upland hardwoods to pine. As a result, net annual hardwood growth and inventories are substantially below the base. Hardwood stumpage prices are higher. This in turn causes a reduction in hardwood lumber production and pulpwood consumption.

Employment and wages and salaries in the forest industries are both substantially above the base levels—by about 36,000 people in the case of employment. However, employment in 2030 is still about 49,000, or 12 percent, below the 1984 level. Increasing labor productivity and the drop in the output of hardwood products override the increases in softwood harvests and product production.

4. All of the alternative futures that were run indicate that the South and the Nation are faced with the prospect of continuing real increases in stumpage prices for most species and sizes of timber, and in the prices of most timber products. The increases are likely to be largest for softwood sawtimber; high-quality hardwood sawtimber of preferred species; and the products, mainly lumber and plywood, made from this sawtimber. There are also substantial price increases for softwood pulpwood stumpage. This is a significant change; pulpwood stumpage prices, measured in constant dollars, have been stable for over a hundred years. The largest increases in stumpage prices result from reduced timber growth; the smallest increases, from the planting of pine on marginal cropland and pasture combined with implementing the economic opportunities on private timberlands.

All of the futures analyzed also showed that the South is facing declining employment in the lumber and wood products and pulp and paper products industries. This is of great significance because of the potential effects on the industries supplying goods and services to the forestry sector. As with prices, the largest drop in employment resulted from

All of the analyses that have been made in this study show that the South and the Nation are facing a future of continuing real increases in stumpage prices for most species and sizes of timber and timber products. They also show the South is facing declining employment in the forest industries. But this outlook can be changed. There are large opportunities to increase timber supplies through planting and other management practices.

reduced timber growth; the smallest drop is associated with planting pine on marginal cropland and pasture combined with implementing the economic opportunities on private timberland.

Finally, the analyses show that it takes large changes in the factors affecting timber demand or supply to significantly alter the upward trends in prices and the declining trends in employment. But large changes can be accomplished. For example, if all the economic opportunities to increase net annual growth timber on timberland were utilized and marginal cropland and pasture were planted to pine, as described in chapter 5, net annual timber growth could in time be increased by 5.3 billion cubic feet. This is enough timber to sustain the forest industries in the South and employment and wages and salaries.

As described in the following chapter, continued increase in timber growth in the South can be achieved, and it can be achieved economically. The rates of return on the investments necessary to implement the opportunities to increase net annual growth would be comparable to the longrun average in the private sector. But achieving the potential will require an expansion in the public and private programs of technical and financial assistance, protection, research, education, and management that goes far beyond anything experienced to date.

Literature Cited

Joint Council on Food and Agricultural Sciences. 1984. Reference document: needs assessment for the food and agricultural sciences; Washington, DC: Joint Council on Food and Agricultural Sciences. 328 p.

Haygreen, J.; Gregersen, H.; Holland, I.; Stone, R. 1986. The economic impact of timber utilization research. Forest Products Journal. 36(2): 12–20.

Skog, K.; Haynes, R. 1987. The stumpage market impact of timber utilization research. Forest Products Journal. 37(6): 54–60.

U.S. Department of Agriculture, Forest Service. 1982. Analysis of the timber situation in the United States, 1952–2030. For. Resour. Rep. 23. Washington, DC: U.S. Department of Agriculture, Forest Service. 499 p.

Chapter 5

Opportunities for Increasing Timber Supplies Through More Intensive Forestry

Large acreages of timberland in the South are not producing at their potential. Such stands can be overmature, poorly stocked, stocked with undesirable species, or suppressed by competing vegetation. Substantial areas that could profitably grow timber are not stocked at all.

Economic Opportunities To Increase Timber Supplies on Timberland

The preceding material in this study has described what is likely to happen to the southern timber resource, and the associated sectors of the economy and other renewable resources, if current expectations about economic growth, changes in timberland, timber management practices, and all the other factors affecting timber demand and supply are realized. As explained earlier, this outlook can be changed through the implementation of various policies, programs, or legislation options currently being considered. The effects of those policies and programs presented in chapter 4 show that if economic growth in the forestry sector—in employment and in wages and salaries—is to be sustained in the South, it will be necessary to increase timber supplies greatly.

The basic purpose of this chapter is to quantify the opportunities to increase timber supplies through the practice of more intensive forestry. The analysis is divided into two parts: (1) the economic opportunities on timberland, and (2) the opportunities on marginal cropland and pasture, including highly erodible land, that would yield higher rates of return to the owners if planted to pine or allowed to naturally revert to forests.

Past studies and data collected as part of the inventories of the forest resources of each State show that there are millions of acres of timberland in the South that are not producing timber at their potential. Large acreages could be managed to grow higher wood volumes per acre, more preferred species, or higher valued products. Opportunities to increase timber supplies exist on stands that are poorly stocked, have competing vegetation, have offsite species, are overmature, or are in some other less productive condition. The acres that could be treated, their location and ownership, rates of return on recommended treatments, and the additional volumes of timber that could be produced through more intensive management are described below.

Data Base, Analytical Structure, and Assumptions

Timberland Area Needing Treatment—The primary statistical base for the analyses of opportunities to increase timber supplies was the data on timberland areas needing treatment to improve productivity compiled for each State by the Forest Inventory and Analysis units of the Southeastern and Southern Forest Experiment Stations. Though the most recent State data available at the start of this study were used, the year of collection ranged from 1976 to 1986. The acres needing treatment are shown in table 5.1 for each State, by ownership. The data in table 5.2 show the distribution of acres for the entire South, by forest management type and treatment need.

In the Southeast, the forest inventory field crews examined sample plots and recommended specific treatment opportunities to correct stand deficiencies and improve productivity. They identified 43 percent of all Southeast timberland, about 37 million acres, as needing some treatment. In the South Central region, treatment opportunities were determined by applying treatment selection criteria based on specific plot conditions of forest management type, tree size, stocking, and other stand parameters. In the South Central region, 46 percent of timberland, about 45 million acres, needed treatment. Both methods produced comparable information on treatments needed to increase timber production.

For the purpose of analyzing the economic opportunities, the acres needing treatment were classified on the basis of nine treatment needs, four ownerships, three site classes, and six forest management types, including nonstocked land, as detailed below, and 52 sub-State regions as shown in figure 5.1.

Table 5.1—Area of timberland in the South needing treatment to improve productivity, by region, State, and ownership

Thousand acres

Region and State	All timberland	Timberland needing treatment: Total	Forest industry	Other private	National forest	Other public
Southeast						
Florida	15,337	7,847	1,818	4,974	430	625
Georgia	23,535	9,960	1,882	7,401	275	401
North Carolina	18,358	7,745	960	5,881	534	371
South Carolina	12,230	4,864	742	3,698	226	197
Virginia	15,436	6,544	761	4,799	771	212
Total	84,896	36,960	6,163	26,753	2,236	1,806
South Central						
Alabama	21,577	10,633	2,352	7,702	338	242
Arkansas	15,950	6,560	1,412	3,977	907	264
Louisiana	13,797	7,572	2,164	4,726	223	460
Mississippi	16,072	5,928	1,098	4,356	367	108
Oklahoma	4,748	2,958	420	2,263	72	204
Tennessee	12,937	5,970	532	4,874	264	300
Texas	12,187	5,089	1,177	3,632	191	88
Total	97,268	44,710	9,155	31,530	2,362	1,666
Southwide total	182,164	81,670	15,318	58,283	4,598	3,472

Table 5.2—Area of timberland in the South needing treatment to improve productivity, by forest management type and treatment need

Thousand acres

Treatment need	All management types	Forest management type: Nonstocked	Pine plantations	Natural pine	Pine–hardwoods	Upland hardwoods	Bottomland hardwoods
Regenerate with site preparation	35,472	3,074	571	4,147	4,814	14,652	8,211
Regenerate without site preparation	1,992	521	45	132	94	721	479
Convert stand to preferred species	2,326		58	205	309	1,165	589
Precommercial thin seedlings and saplings	1,547		357	447	248	382	113
Commercial thin poletimber stands	7,436		2,047	3,327	650	771	640
Stocking control, clean, or release	16,171		604	2,344	3,141	7,486	2,595
Clearcut mature stands and regenerate	13,158		388	4,603	1,347	3,840	2,974
Salvage harvest and regenerate	3,577		208	467	290	1,259	1,353
All treatments	81,679	3,595	4,278	15,674	10,893	30,275	16,955

Figure 5.1—Sub-State regions used in analyzing economic treatment opportunities

Treatments:

1. Regenerate with site preparation.
2. Regenerate without site preparation.
3. Convert stand to preferred species.
4. Precommercial thin seedlings and saplings.
5. Commercial thin poletimber stands.
6. Stocking control, cleaning, or release.
7. Clearcut overmature timber and regenerate.
8. Salvage damaged timber and regenerate.
9. No treatment needed.

Ownerships:

1. National forest.
2. Other public.
3. Forest industry, including leased private lands.
4. Other private, including farmer, corporate, and other individual.

Site classes:

1. High sites (those growing 85+ cubic feet per acre per year).
2. Medium sites (those growing 50–85 cubic feet per acre per year).
3. Low sites (those growing 20–50 cubic feet per acre per year).

Forest management types:

1. Nonstocked land.
2. Pine plantations (loblolly/shortleaf and longleaf/slash).
3. Natural pine (loblolly/shortleaf and longleaf/slash).
4. Mixed pine–hardwoods (oak–pine).
5. Upland hardwoods (oak–hickory).
6. Bottomland hardwoods (elm/ash/cottonwood).

Management Options—Timber management options, or sets of management practices, were developed for each combination of treatment, forest management type, and site class. Although many management options are possible, only one option was selected and evaluated for each group of acres. In most cases, but not all, the selected management option was to establish pine plantations.

Bottomland hardwood stands were not converted to pine except in cases where stand conversion was recommended as the needed treatment by forest inventory data. Natural pine, mixed pine–hardwood, and upland hardwood forest management types on low sites were assumed to be managed by natural regeneration methods in most instances. Only in cases where site preparation was required for regeneration, salvage, or type conversion of low sites for these types did management options include artificial regeneration to pine plantations.

The same base options were used for all ownerships and production regions because data available were insufficient to develop consistent sets of options for different ownership classes or regions. Each management option specified the management activities required, timing of treatments and harvests, timber yields, forest types, and stocking levels. These factors were used to develop projected cash-flows. Separate options were developed for managed and unmanaged stands. The treated option was used to project results if specific management practices were applied to increase productivity. The untreated option was used to determine expected timber harvests for untreated stands.

All management options for treated stands were carried out for three to five full rotations, a minimum of 150 years. In cases where pine plantations were established, these were continued in subsequent rotations. This method was used to establish a consistent investment period for comparison with cost and revenue expectations from similar, but untreated, stands.

Management options were also developed for each untreated stand condition to reflect opportunity costs. Minimal custodial management was assumed to continue for these cases indefinitely. In most cases, rotation ages were longer, yields and stocking levels were lower, expected revenues were lower, and costs were minimal or zero. These untreated stands were carried for two to four rotations, also a minimum of 150 years for comparability. For all forest management types except upland and bottomland hardwoods, forest succession was assumed to occur following harvest. Natural pine stands were assumed to revert eventually to upland hardwoods after 100 to 150 years if not treated following harvest. The financial consequences of these conditions were factored into the financial analyses.

Many specific assumptions on current stand ages, stocking levels and volumes, rotation ages, regeneration survival, thinning ages, and responses to treatments were required in order to construct each management option. Although all assumptions are not detailed here, the stand conditions and management options commonly associated with each treatment are briefly described next.

Regenerate With Site Preparation—These acres lack a manageable timber stand because of inadequate growing stock. Growth will be considerably below potential for the site if the area is left alone. This treatment category contains the greatest number of acres. Examples of these stands are nonstocked lands with competing vegetation requiring site preparation, cutover sites with residual stems, poorly stocked stands severely overcut or high-graded in the past, and stands with low stocking requiring clearing before reforestation. The recommended treatment is to prepare the site and regenerate by natural or artificial methods. Although natural regeneration is a viable option for some sites, the establishment of pine plantations on most sites was evaluated. This treatment represented a conversion to planted pine for most forest management types. Natural regeneration was evaluated for bottomland hardwoods on high sites.

The largest opportunity to increase net annual timber growth in the South is through site preparation and regeneration. Four kinds of properties can benefit from this treatment: nonstocked timberlands with competing vegetation, cutover lands with residual trees, poorly stocked lands severely overcut or high-graded in the past, and stands with few trees to be cleared before reforestation.

Regenerate Without Site Preparation—These acres lack a manageable timber stand because of inadequate growing stock. Although these stands will eventually regenerate naturally without treatment, growth will be considerably below potential if they are left alone. Prospects are not good for adequate natural regeneration on most sites. Examples of these sites include nonstocked land with little vegetation, recently harvested stands with few residuals, failed new plantations, and similar stands. The recommended treatment is to plant with little or no site preparation. The management option evaluated on most sites was to plant pine. Natural regeneration was evaluated for all bottomland hardwood sites and upland hardwood or mixed pine–hardwood stands on low sites.

Convert Stands of Undesirable Trees to Preferred Species—These are stands of undesirable, chronically diseased, or offsite species. Growth and quality will be considerably below potential if these stands are left alone. Examples of these stands include slash pine in areas subject to severe ice storms, pines heavily infested with fusiform or other diseases, some hardwood stands on pine sites, and stands with less preferred species distributions. No information was available from survey data to indicate specific limitations on these acres. The recommended treatment is to convert stands to a different forest management type or species. Establishment of pine plantations was evaluated for all sites.

Precommercial Thin Overstocked Seedling and Sapling Stands—These stands are densely stocked and likely to stagnate if not treated. Examples of these sites include pine plantations with many volunteer stems, doghair natural pine stands, hardwood thickets, and similar young, unmerchantable stands with too many trees per acre. The recommended treatment is to reduce stocking by precommercial thinning to help crop trees attain dominance.

Commercial Thin Dense Poletimber Stands—These are poletimber stands with dense growing stock. Examples of these stands are overstocked natural and planted pine stands in need of thinning and well-stocked hardwood stands needing pulpwood removal. The recommended treatment is to reduce stocking by commercial thinning to prevent stagnation and confine growth to fewer but high-quality crop trees. This management option included thinning, growing to rotation age, and then converting to pine plantations with site preparation on all sites. Bottomland hardwood sites and mixed pine–hardwood or upland hardwood stands on low sites were naturally regenerated after final harvest.

Control Stocking of Undesirable Trees—These are stands with adequate seedling, sapling, and/or poletimber growing stock mixed with competing vegetation either overtopping or otherwise inhibiting the development of crop trees. These stands are adequately stocked, but less desirable stems in the stand are limiting the growth of crop trees. Examples are pine stands with encroaching hardwood competition, mixed pine–hardwood stands in which pine growth is reduced by less desirable hardwood trees, and hardwood stands with competition from undesirable species or trees with poor form. These stands need deadening or removal of culls, wolf trees, or other stems that will not earn an adequate return. The recommended treatment is to control stocking of undesirable trees with mechanical or chemical methods in order to release overtopped trees, to prevent stagnation, and/or improve composition, form, or growth of the residual stand. Management options evaluated the timber stand improvement treatment and subsequent regeneration to pine on most sites following final harvest.

Many acres of overstocked stands in the South need thinning to prevent stand stagnation and enhance the growth of fewer, but higher quality, trees.

Harvest Mature or Overmature Sawtimber Stands and Regenerate—These are mature or overmature sawtimber stands with sufficient volume to justify a commercial harvest. They are adequately stocked older stands past financial maturity. Most stands contain valuable sawtimber and could be held, but the volume and value growth rate of a replacement stand would be higher. The recommended treatment is to clearcut the stand and regenerate by natural or artificial methods. Establishment of new pine plantations was assumed on most sites, with natural regeneration on some low sites and bottomland hardwood sites.

Salvage Damaged Timber and Regenerate—These are stands with excessive damage to merchantable timber due to fire, insects, disease, wind, ice, or other destructive agents. These stands may contain unproductive areas where timber has been lost, trees have broken tops, or where damage from insects or diseases will increase unless the stand is harvested. Because these stands are severely damaged, average growth and yields of higher valued products are significantly reduced. The recommended treatment is harvest or removal of damaged or threatened timber, followed by regeneration. The management options called for immediate harvest of remaining timber and planting to pine in most cases.

Most of the management options described above are directed toward pine production. Many, but not all, of these can yield returns on the needed investments that would meet or exceed the longrun average rate of return to capital in the private sector. An infinite variety of stand conditions exists, and some of these treatments may be inappropriate for some acres within each category. Many other management options, including natural regeneration, may be feasible and yield adequate returns on investment. However, the management options evaluated were limited primarily because a goal of this study was to determine potential increases in timber volume, particularly pine, from more intensive management. The process used throughout this study could be used equally well to assess other management options.

Prices—Stumpage prices used for analyses of timber investment opportunities were based on average 1985 stumpage prices taken from Timber Mart–South (Norris 1985). The range of 1985 stumpage prices used for each State is shown in table 5.3. Future expected real prices were based on the base price projections shown in chapter 4. Indexes of prices were developed for pine pulpwood, pine sawtimber, and hardwood sawtimber. Hardwood pulpwood prices were kept at constant 1985 levels. Constant 1985 dollars were used for all stumpage prices, and all effects of inflation or

Table 5.3—Range of 1985 timber stumpage prices[1] in the South used for financial analyses of investment opportunities to increase net annual growth, by State

Region and State	Pine pulpwood	Hardwood pulpwood	Pine sawtimber	Hardwood sawtimber
	$/cord	*$/cord*	*$/thousand board feet*	*$/thousand board feet*
Southeast				
Florida	21.11–28.90	3.00–4.00	134–163	38–135
Georgia	12.60–28.10	3.00–4.30	93–168	53–65
North Carolina	6.60–11.30	2.60–5.00	74–154	49–73
South Carolina	11.60–17.50	2.80–4.00	109–161	59–67
Virginia	8.00–12.80	2.50–3.30	65–107	51–54
South Central				
Alabama	13.20–20.80	3.30–5.70	105–156	55–83
Arkansas	11.20–15.30	3.40–4.00	107–141	55–73
Louisiana	16.00–16.70	4.00–4.60	132–139	55–66
Mississippi	11.80–16.00	3.70–4.10	108–136	49–65
Oklahoma	9.80–11.90	2.50	102–124	47–50
Tennessee	8.00–10.30	2.50–2.80	69–96	63–98
Texas	17.20–17.80	3.00	128–30	—

[1] Actual prices used in financial analyses depended on price region and expected real rates of price changes in the Southeast and South Central region.

deflation were excluded. Timber harvests from thinnings and salvage cuts were estimated to earn from 65 to 85 percent of prices paid for clearcuts.

Costs—Costs for forest management treatments used for financial analyses of treatment opportunities were based on cost data furnished by the State study groups listed in the acknowledgments section. The cost data provided by the State study groups were supplemented with additional published information, where available. Only direct costs for treatments, such as stand establishment or stocking control, and direct costs associated with harvesting or selling timber were included. For commercial thinning and final harvest, costs for marking, sale preparation, and/or commissions were included. Costs that would accrue regardless of the treatment, such as ad valorem taxes, were excluded from financial analyses. Land costs and income taxes were also excluded.

The data in table 5.4 show the range of treatment costs for management practices required to implement stand treatments. The costs reported for specific management practices varied widely because of the diversity of local stand conditions, differences in recommended practices, and markets for forestry services across the South. Therefore, high, medium, and low cost levels were identified for each management practice. Separate analyses were done for different cost levels using estimates of the number of acres for each cost level.

For treated stands, opportunity costs due to forgone revenues from untreated stands were included. These opportunity costs were based on revenues that would have been earned if stands were not treated. Similarly, expected future costs for untreated stands were included as forgone or avoided costs for treated stands.

Timber Yields—Empirical yield tables for fully stocked stands were used for each forest type and site class. Harvest timber volumes were based on empirical yields (McClure and Knight 1984) and other data provided by Forest Inventory and Analysis units and State study groups. The data in table 5.5 show the mean annual increment for growing stock trees by site class and forest management type for selected stand ages. Yields were applied to the management options and modified where appropriate, to adjust merchantable volume, pine/hardwood mix, or product distributions for less than full stocking, responses to timber stand improvement or stocking-control treatments (including commercial thinnings), genetic improvement, or other factors leading to more or less merchantable volume. Yields used in the analyses represent averages for all specific forest types included within broader categories. Yields reflected average stocking and growth conditions for all stands in each

Table 5.4—Ranges of direct costs for three treatment cost levels of management practices to increase net annual timber growth in the South

1985 dollars per acre

Management practice	Treatment cost level: Low	Medium	High
Site preparation for pine on nonstocked land	0	20–25	45–85
Site preparation for pine on cutover pine sites	20–25	45–85	90–150
Site preparation for pine on cutover hardwood sites	45–85	90–150	110–180
Plant pine	32–48	40–60	48–72
Natural regeneration of pine	24–48	30–50	36–60
Natural regeneration of hardwood	28–56	35–70	42–84
Precommercial thin	30–40	40–50	48–60
Hardwood control	32–56	40–70	48–84
Release seedlings and saplings	32–40	40–50	48–60
Commercial thin fixed cost	32–40	40–50	48–60

Table 5.5—Mean annual increment of growing stock trees for well-stocked stands in the South, by forest management type and site class for selected stand ages

Cubic feet/acre/year[1]

Forest management type[2]	Site class[2]	Stand age: 25	35	45	55
Pine plantations[3]	High	112	102	94	87
	Medium	76	76	73	70
	Low	40	48	50	51
Natural pine	High	97	90	78	67
	Medium	60	61	56	50
	Low	24	31	32	30
Mixed pine–hardwoods	High	65	63	59	56
	Medium	48	48	45	42
	Low	18	23	24	22
Upland hardwoods	High	64	64	59	52
	Medium	41	45	44	40
	Low	20	27	29	29
Bottomland hardwoods	High	75	73	67	59
	Medium	49	56	55	49
	Low	38	42	40	37

[1] Mean annual increment includes growing stock trees only. Total biomass yield are higher.

[2] See text for description of forest types and site classes.

[3] Yields for pine plantations reflect average survival and stocking for all planted pine types and the use of genetically improved planting stock.

group rather than site-specific yields. Yield tables included growing stock volume, percent pine stocking, and percent of growing stock volume in sawtimber.

Economic Assumptions and Analysis—Management options were analyzed to determine present net worth and internal rate of return. All analyses were conducted in real terms, and inflation effects were excluded. No income taxes, ad valorem taxes, or land costs were included in the analyses. A 4-percent real rate of return was used for discounting all costs and revenues. This 4-percent rate approximates the average longrun rate of return to capital in the private sector. All management options were projected for long periods of time so that treated and untreated cases were comparable. All costs were assumed to remain constant in real terms.

Although 4 percent approximates the average longrun rate of return on investments in the private sector of the economy, it is an average, and many management options yield higher rates of return. Some of the investments in stand treatments could yield rates of return in the range of 15 to 20 percent. In order to provide some measure of the size of the economic opportunities to increase net annual timber growth with high rates of return, all options were also analyzed with a 10-percent rate of return.

Management options were combined with treatment costs and stumpage prices for each production region to construct

tables of cash-flows for each investment opportunity. Cash-flows were analyzed to determine present net worth, internal rate of return, net volume changes, and impacts of capital costs on a per-acre basis. Financial results for 34 production regions were combined with acreage data for 52 State subregions to estimate financial returns for all acres in each subregion. Similar analyses were also conducted to figure financial returns for constant real stumpage prices.

Area of Timberland With Economic Opportunities To Increase Net Annual Timber Growth

The results of the analyses described above show that there are economic opportunities—those that would yield 4 percent or more in constant dollars on the investments—to increase net annual timber growth on 70 million acres, or 38 percent of all the timberland in the South (table 5.6, fig. 5.2, app. table 5.1). There are another 11.6 million acres needing treatment that would yield less than 4 percent on the investments.

A little over half of the area with economic opportunities—36.5 million acres—is in the South Central region (app. table 5.3). The remaining acres—some 33.5 million—are in the Southeast (app. table 5.2). The largest acreage is in Alabama, 9.6 million acres. Economic opportunities exist on over 4 million acres in all Southern States except Oklahoma (table 5.6).

Over 50 million acres, nearly three-quarters of the area with economic opportunities, are in the other private ownerships; another 13 million acres, or nearly a fifth of the total, are in the forest industry ownership (fig. 5.3). Most of the remaining area with economic opportunities is in national forests.

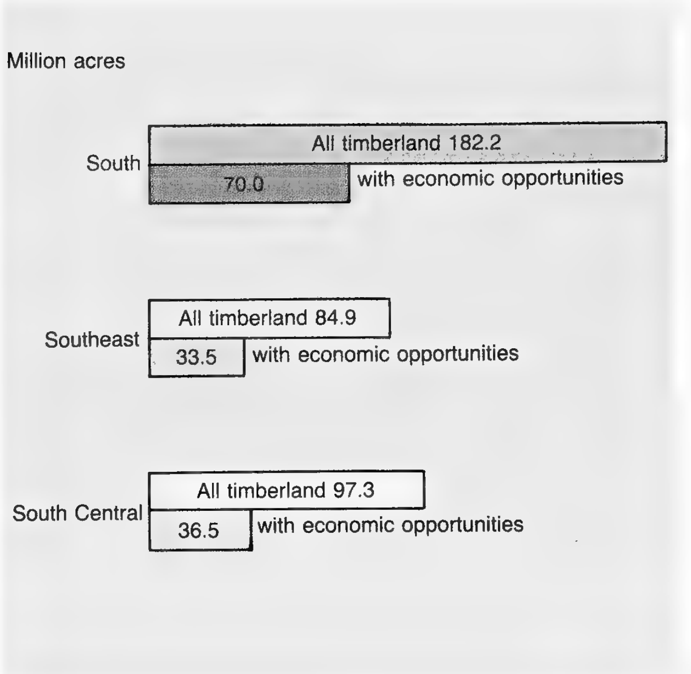


Figure 5.2—Area of timberland with economic opportunities to increase net annual growth in the South, by region

There are economic opportunities—those that would yield 4 percent or more on the investments—to increase net annual timber growth on 70 million acres of timberland in the South. This is 39 percent of all the timberland in the area.

The ownership distribution is about the same in both of the southern regions and in most States. There are, however, some State differences. For example, forest industry ownerships with economic opportunities range from 8 percent of the total in Tennessee to 31 percent in Louisiana. In all States, the largest area with opportunities is in the other private ownerships.

The largest economic treatment opportunity in the South—some 30 million acres, or 43 percent of the total—is regeneration with site preparation (fig. 5.4). Stocking control (14 million acres), clearcut mature stands and regenerate (13 million acres), and commercial thinning of poletimber stands (5 million acres) account for most of the remaining treatment opportunities.

The relative ranking of the economic treatment opportunities in the regions and most States is much the same as that for the South as a whole, although there are some differences. For example, regeneration with site preparation

Table 5.6—Timberland needing treatment to improve productivity in the South, the area of timberland with opportunities for increasing net annual timber growth which will yield 4 percent or more,[1] and the associated treatment cost and net annual growth increment, by region and State

Region and State	Timberland needing treatment	Treatment opportunities earning 4 percent or more	Treatment cost	Net annual growth increment
	Million acres	*Million acres*	*Million dollars*	*Million cubic feet*
Southeast				
Florida	7.8	7.2	645	271
Georgia	10.0	9.2	797	419
North Carolina	7.7	7.0	652	321
South Carolina	4.9	4.4	420	183
Virginia	6.5	5.7	531	272
Total	37.0	33.5	3,044	1,467
South Central				
Alabama	10.6	9.6	864	487
Arkansas	6.6	4.8	534	213
Louisiana	7.6	6.1	595	300
Mississippi	5.9	4.7	469	246
Oklahoma	3.0	2.4	301	90
Tennessee	6.0	4.6	582	238
Texas	5.1	4.4	477	207
Total	44.7	36.5	3,822	1,782
Southwide total	81.7	70.0	6,866	3,248

[1] Financial yields are measured in constant dollars, net of inflation or deflation.

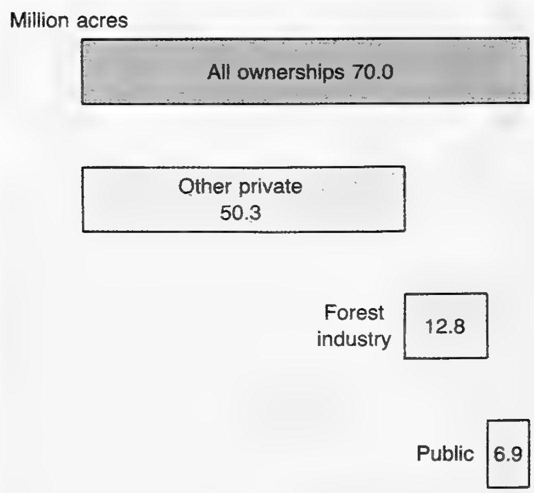


Figure 5.3—Area of timberland with economic opportunities to increase net annual timber growth in the South, by ownership

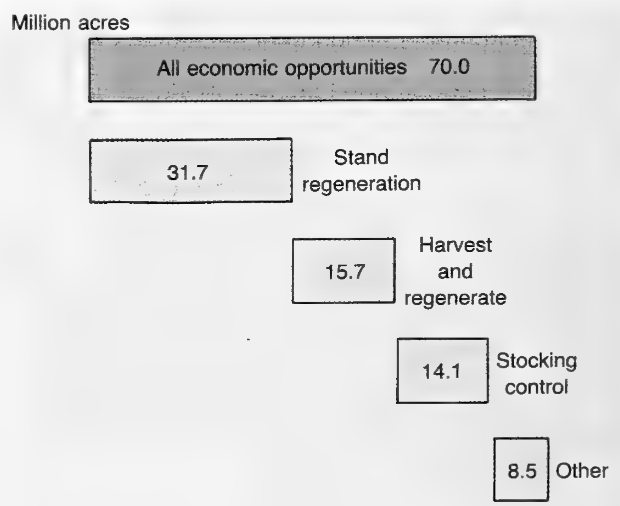


Figure 5.4—Area of timberland with economic opportunities to increase net annual timber growth in the South, by treatment

accounts for 70 percent of the treatment opportunities in Florida but only 28 percent in North Carolina.

Of the 30 million acres with economic opportunities to regenerate with site preparation in the South, nearly 14 million are on cutover lands in the upland hardwood management type. The remaining area with opportunities for regeneration is about evenly spread among the other management types, except pine plantations. Opportunities on pine plantations are limited because most plantations are growing timber near their potential. There are also some 3 million acres of nonstocked timberlands with economic opportunities for regeneration.

About 45 percent, 6.4 million acres, of the opportunities for stocking control are in the upland hardwood management type. There are, however, substantial acreages in the other management types besides pine plantations, where spacing is controlled.

A little over a third, 4.6 million acres, of the economic opportunities to clearcut mature stands and regenerate are in the natural pine management type. Most of the rest of the opportunities to cut mature stands are in the upland hardwood and bottomland hardwood management types.

Nearly two-thirds, 3.3 million acres, of the opportunities for commercial thinning are in poletimber stands in the natural pine management type. All of the other management types have some opportunities for commercial thinning; the largest acreages are in the mixed pine–hardwood and upland hardwood types.

Potential Increases in Net Annual Growth With Utilization of Economic Treatment Opportunities

If all of the economic treatment opportunities—those yielding 4 percent or more—were utilized, net annual timber growth in the South could be increased by 3.2 billion cubic feet (fig. 5.5, app. table 5.1). This volume is equal to 57 percent of the net annual softwood growth on southern timberland in 1984, and 64 percent of the softwood harvests.

A little over one-half, some 1.8 billion cubic feet, of the economic opportunities for increasing net annual timber growth lies in the South Central region (app. table 5.3). The remainder, 1.5 billion cubic feet, is in the Southeast (app. table 5.2). There are economic opportunities to increase net annual timber growth in all of the Southern States (table 5.6). The potential ranges from 90 million cubic feet in Oklahoma to 487 million cubic feet in Alabama. The potential is above 200 million cubic feet per year in all States except Oklahoma and South Carolina.

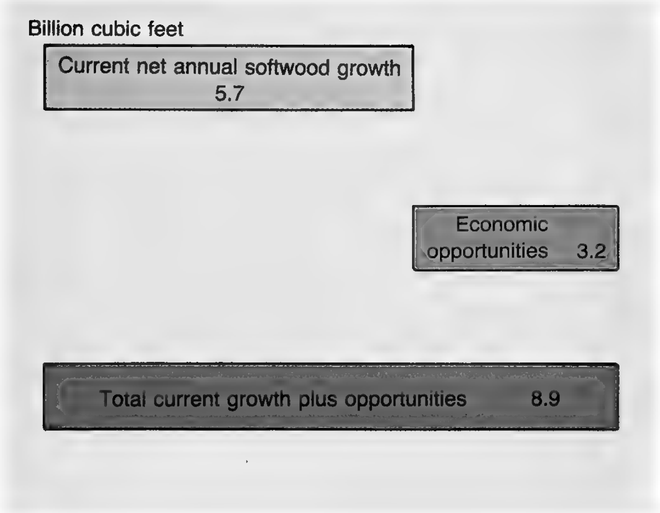


Figure 5.5—Economic opportunities to increase current net annual growth on timberland in the South

Most of the economic opportunities to increase net annual timber growth, 2.3 billion cubic feet, are on the other private ownerships (fig. 5.6). This distribution primarily reflects the large acreage of timberland in these ownerships and less-intensive management practices.

About a fifth of the opportunities to increase net annual growth—some 0.6 billion cubic feet—is on the forest indus-

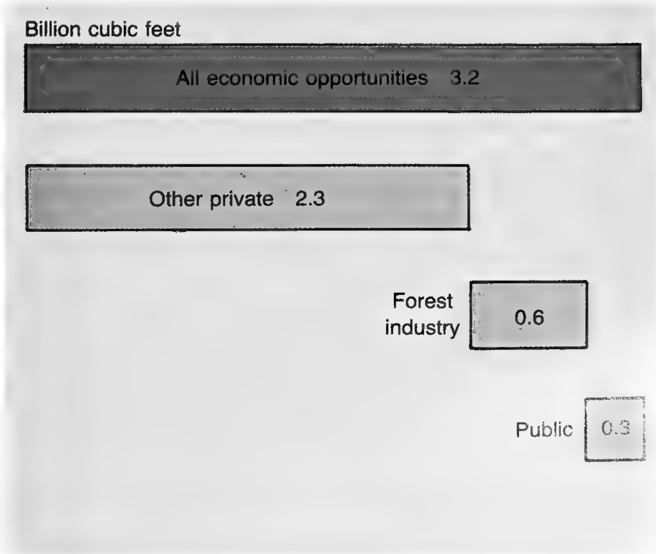


Figure 5.6—Economic opportunities to increase net annual growth on timberland in the South, by ownership

Most of the economic opportunities to increase net annual timber growth in the South are on the other private ownerships. This primarily reflects the large acreages of timberland in those ownerships and less-intensive management practices.

try ownerships, with the remainder—0.3 billion cubic feet—on the public ownerships.

The distribution of the economic opportunities by ownership in both regions and in most States is much the same as that for the South. In most States, around three-quarters of the opportunities are on the other private ownerships, but there are some exceptions. In Tennessee, 84 percent of the opportunities are on the other private ownerships; in Arkansas, 54 percent. As in the South, there are opportunities to increase net annual growth on all ownerships in every Southern State.

Nearly half of the economic opportunities to increase net annual growth, 1.5 billion cubic feet, consists of regeneration of cutover and nonstocked sites (fig. 5.7). About half of the regeneration opportunities are on cutover sites in the upland hardwood management type. There are also opportunities on the mixed pine–hardwood management type (248 million cubic feet) and the natural pine type (202 million cubic feet). On the relatively small acreages of nonstocked land, there are opportunities to increase net annual timber growth by 154 million cubic feet. Regeneration opportunities on pine plantations are only 24 million cubic feet, an indication of the high success rate of planting. Three-quarters of the opportunities for regeneration are on the other private ownerships. Nearly all of the rest are on the forest industry ownerships.

After regeneration, the next largest treatment opportunity is harvest and regeneration of existing stands (819 million cubic feet). Most of this opportunity is harvest of mature stands, although salvage of stands damaged by fire, insects, disease, and other destructive agents is also important. A little over a third of the opportunities for harvest and regeneration are in stands in the natural pine management type. Another third are in upland hardwood stands. The remainder are about equally divided between mixed pine–hardwood and bottomland hardwood stands.

Two-thirds of the harvest opportunities are on other private lands and another fifth are on forest industry holdings. Because of the policy of growing timber on longer rotations, there is also a substantial potential to increase net annual growth through harvest and regeneration on national forest holdings.

The third largest treatment opportunity for increasing net annual timber growth is stocking control in adequately stocked stands that also have inhibiting vegetation. Implementing these treatment opportunities would increase net annual growth by 559 million cubic feet a year. Most of this potential, some 279 million cubic feet, is in upland hardwood stands, although there are also large potentials in the mixed pine–hardwood and natural pine management types. As with other treatment opportunities, most of those for stocking control—three-quarters of the total—are on the other private ownerships.

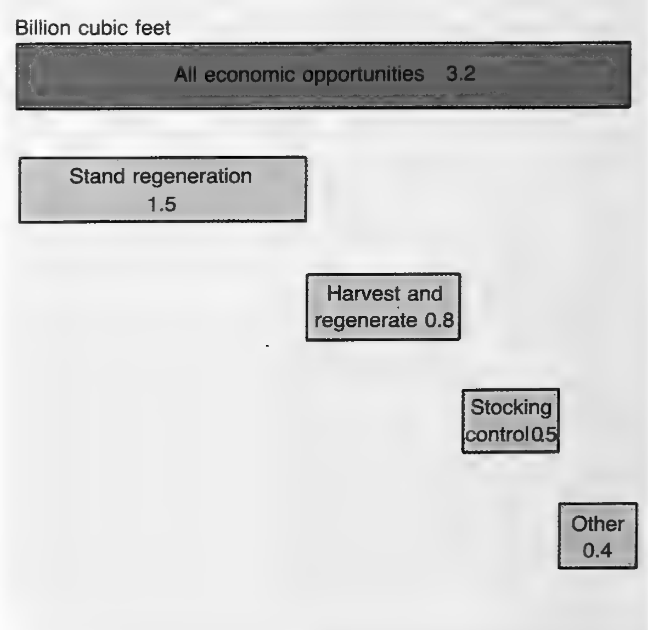
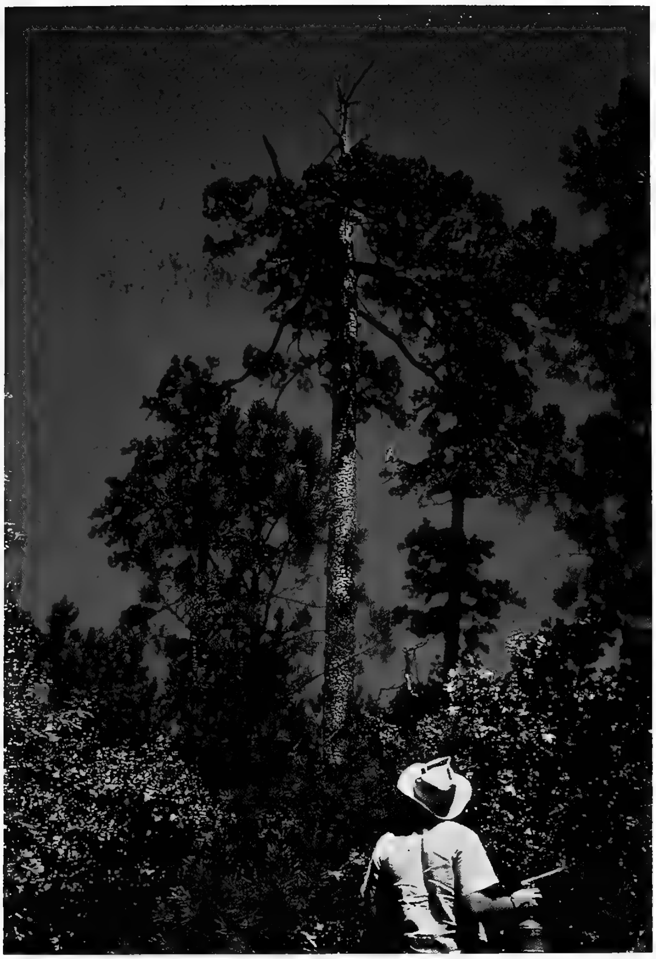


Figure 5.7—Economic opportunities to increase net annual growth on timberland in the South, by treatment



There are large opportunities to increase net annual timber growth in the South by harvesting and regenerating mature timber stands and stands damaged by fire, insects, disease, and other destructive agents.

Precommercial and commercial thinning of stands could increase net annual growth by about 260 million cubic feet. The bulk of these opportunities are in natural pine stands on the other private ownerships. Most of the gain from these treatments results from shifts of timber volume to merchantable growing stock and more intensive management of subsequent rotations.

Investment Opportunities To Increase Net Annual Growth

Implementing the economic treatment opportunities would require a capital investment of $6.9 billion (1984 dollars) (app. table 5.1). Investors would earn a minimum 4-percent rate of return measured in constant dollars net of inflation or deflation. This rate approximates the longrun average return on capital invested in the private sector of the economy.

The investment opportunities in the Southeast amount to a little over $3 billion; those in the South Central region, $3.8 billion (app. tables 5.2 and 5.3). The investment opportunities in the States go up from $301 million in Oklahoma to $864 million in Alabama (table 5.6). In most States they range between $400 million and $600 million.

Nearly three-quarters of the investment opportunities are on the other private ownerships. Only a limited part of these opportunities may be implemented. These owners have widely diverse objectives and attitudes; limited technical knowledge of the ways timber stands should be harvested, regenerated, and managed; and a varying willingness and capacity to make investments in management practices. Ownership tenures are typically short, and most owners are in the older age groups. Thus, for most treatment opportunities, especially regeneration, where the time between investments and harvest is long, there is little likelihood that direct benefits, such as income from timber harvest, will accrue to current owners.

In 1978 there were some 3.5 million other private owners. Ninety-two percent of these owners had holdings of less than 100 acres. However, the remaining 8 percent, some 276,000 owners, held 73 percent of the timberland in the South. Although no data have been compiled by size of ownership, most of the economic opportunities are undoubtedly on these larger ownerships.

About 16 percent, some $1.1 billion dollars, of the investment opportunities are on the forest industry ownerships. Most of these investments and those on public ownerships are likely to be made.

The largest part of the investment opportunities, about three-fifths of the total, are for stand regeneration (fig. 5.8). This in part reflects the high cost of regeneration with site preparation: $134 per acre. The associated increase in net annual growth is 48 cubic feet per acre.

Nearly a quarter of the investment opportunities are for harvesting and regeneration of mature stands and stands needing salvage. The average cost to harvest and regenerate mature stands is $98, that for salvage and regeneration is $115 per acre. Most of the needed harvest investments, like the investments for all treatment opportunities, are on the other private ownerships.

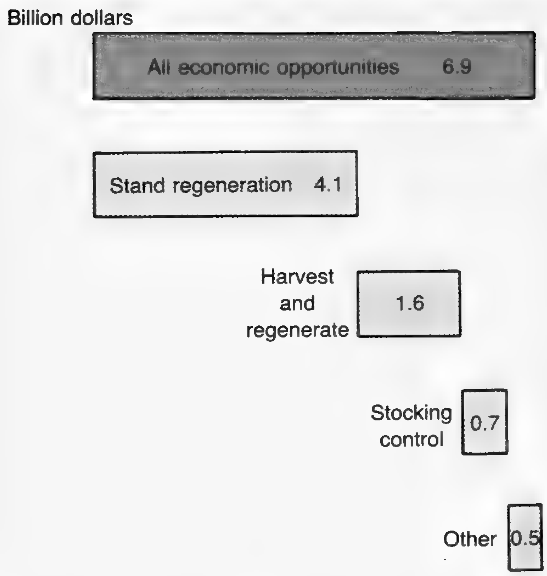


Figure 5.8—Investment opportunities to increase net annual growth on timberland in the South, by treatment

Most of the remaining investments needed for economic treatment opportunities are for stocking control. The average cost of this practice is $48 per acre. The associated increase in net annual growth is 40 cubic feet per acre.

Nearly half of the investment opportunities, $3.3 billion, are in the upland hardwood management type, mostly for regeneration with site preparation. There are also large opportunities, again mostly for regeneration, in the natural pine, mixed pine–hardwood, and bottomland hardwood management types. Investment opportunities on pine plantations are relatively small, $152 million. Over a third of this amount is for regeneration and about a quarter for harvest of mature stands.

The large opportunities to increase timber supplies in the South reflect general silvicultural and economic conditions. In most cases, treatments are profitable because they increase net annual timber growth. However, some profitable opportunities also shift timber volume to higher value products, and/or accelerate earnings from stands.

The difference between yields of managed and unmanaged stands indicates that improvements in biological productivity can be made on many acres throughout the South. Many stands can produce higher timber yields through more intensive management. By increasing stocking and by more carefully managing stand growing stock, landowners can increase timber yields and the economic returns.

Many stands have profitable opportunities because they have been high-graded or overcut in the past without subsequent management to restore productivity. Harvesting without adequate regeneration has left many stands poorly stocked, often with the least desirable trees, and producing far below potential. Without restoration of timber stands following cutting on these sites, longrun productivity is impaired.

Yield gains from treatments do not alone account for the many profitable investment opportunities. Market factors promise better returns from timber stumpage in the future. Timber markets are good and improving in many areas of the South. The base projections indicate that real price increases for pine timber will continue in the future. As stumpage prices increase, the value of added timber yields also rises, but this market effect accounts for only part of the economic opportunities. As described below, many treatments remain profitable even if stumpage prices remain constant.

Economic Opportunities To Increase Net Annual Timber Growth With Constant Stumpage Prices

The estimates of acres of economic treatment opportunities described above were based on expectations that real prices for stumpage would rise through 2030 as shown by the base projections in chapter 4. Because these price assumptions have a significant effect on potential profits from more intensive management, the entire set of treatment opportunities was also analyzed with stumpage prices held constant at 1985 levels. Although these results are not fully detailed in this report, they are summarized below.

For constant real prices, Southwide investment options potentially earning 4 percent above inflation or more are found on 62.3 million acres, compared with 70.0 million acres when real price increases are factored into the analyses. These acres could annually produce an added 3.0 billion cubic feet of timber for an investment of $5.8 billion. Therefore, 89 percent of the acres with investment opportunities earning 4 percent or more with rising real prices will still earn at least 4 percent with constant real prices.

Economic Opportunities To Increase Net Annual Timber Growth That Would Yield 10 Percent or More on the Investments

The data in appendix tables 5.1–5.3, described in the previous section, show the economic opportunities that would

yield at least 4 percent on investments in treatment opportunities on timberland. Investments in many of these opportunities would have rates of return much higher than 4 percent, in many cases rates that compare favorably with the highest rates of return attainable on investments in other types of economic activity. For example, there are economic opportunities that would yield 10 percent or more in constant dollars on investments on 36 million acres of timberland, 52 percent of the acres with opportunities yielding at least 4 percent (app. table 5.4).

The regional distribution of the areas that would yield 10 percent or more is very similar to that of the areas yielding 4 percent—a little over half in the South Central region and a little less than half in the Southeast (app. tables 5.5 and 5.6). Opportunities by State are shown in table 5.7. There are substantial changes in the distribution of the opportunities among States from the 4-percent level. The opportunities by State and the changes between rates are briefly summarized in the following section.

The distribution by ownership at the 10-percent rate of return is also roughly similar to that at 4 percent, although the proportion of the area in other private ownerships is somewhat smaller and that in forest industry ownerships somewhat larger (fig. 5.9).

At the 10-percent rate of return, there are some substantial shifts in the economic opportunities among management types (fig. 5.10). The area with economic treatment opportunities in upland hardwoods is greatly reduced, while that in pine plantations and natural pine is not much changed.

At the 10-percent rate of return, there are also some substantial shifts among the economic treatment opportunities (fig. 5.11). The biggest change is in regeneration with site preparation. The area at the 10-percent rate of return is only a quarter of that at the 4-percent rate. This decrease primarily reflects the relatively high cost of this kind of treatment. The area with opportunities for stocking control is also greatly reduced. In contrast, there is no change in the area with

Table 5.7—Timberland needing treatment to improve productivity in the South, the area of timberland with opportunities for increasing net annual timber growth which will yield 10 percent or more,[1] and the associated treatment cost and net annual growth increment, by region and State

Region and State	Timberland needing treatment	Treatment opportunities earning 10 percent or more	Treatment cost	Net annual growth increment
	Million acres	*Million acres*	*Million dollars*	*Million cubic feet*
Southeast				
Florida	7.8	3.0	170	118
Georgia	10.0	5.3	379	256
North Carolina	7.7	4.2	356	204
South Carolina	4.9	2.2	155	97
Virginia	6.5	3.0	275	150
Total	37.0	17.7	1,335	825
South Central				
Alabama	10.6	6.1	505	327
Arkansas	6.6	2.0	184	105
Louisiana	7.6	4.4	370	229
Mississippi	5.9	3.0	247	163
Oklahoma	3.0	0.3	17	12
Tennessee	6.0	0.9	92	49
Texas	5.1	2.0	164	114
Total	44.7	18.7	1,579	998
Southwide total	81.7	36.4	2,914	1,822

[1] Financial yields are measured in constant dollars, net of inflation or deflation.

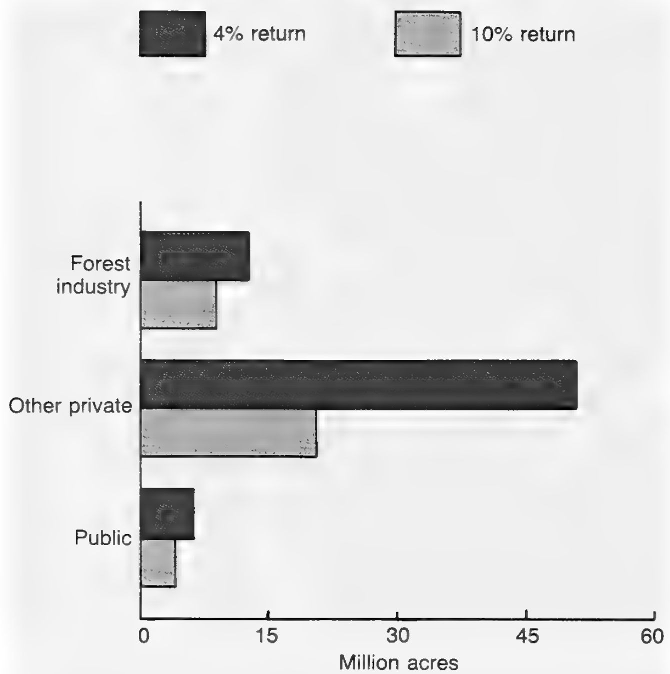


Figure 5.9—Area of timberland with economic opportunities to increase net annual growth in the South, by rate of return and ownership

opportunities to harvest and replant mature timber and relatively little change in the area of the other treatment opportunities.

Utilization of the treatment opportunities on timberland that would yield 10 percent or more on the investments would increase net annual growth by 1.8 billion cubic feet, 56 percent of the growth attainable from the investments at the 4-percent rate. The regional distribution of the opportunities to increase net annual growth is much the same at both rates of return. However, at the 10-percent rate the proportion of the growth on the other private ownerships is reduced and that on forest industry ownerships is increased (fig. 5.12). This shift apparently reflects differences in site quality, treatment opportunities, and treatment costs.

At the 10-percent rate of return, the opportunities to increase net annual growth on upland hardwood stands are only 38 percent of the total at the 4-percent rate (fig. 5.13). The opportunities are also greatly reduced on bottomland hardwood and mixed pine–hardwood sites and on nonstocked land. Pine plantations are the least affected by the higher rate.

The economic opportunities to increase net annual growth by regeneration with site preparation at the 10-percent rate of return are only a third of those at the 4-percent rate (fig. 5.14). Presumably, this decrease largely reflects the high per-acre cost of this kind of treatment. There is also a big reduction in the opportunities for stocking control. The opportunities to harvest mature stands are unchanged, and most of the other opportunities remain close to those at the 4-percent rate.

The capital investment for the opportunities with a 10-percent rate of return would be $2.9 billion, 42 percent of that at the 4-percent rate. The average treatment cost per acre also declines from $98 to $80, an 18-percent drop. This decline means that many of the higher cost opportunities, particularly those for regeneration with site preparation, are screened out. The pattern of the investment opportunities by region, ownership, management type, and treatment are

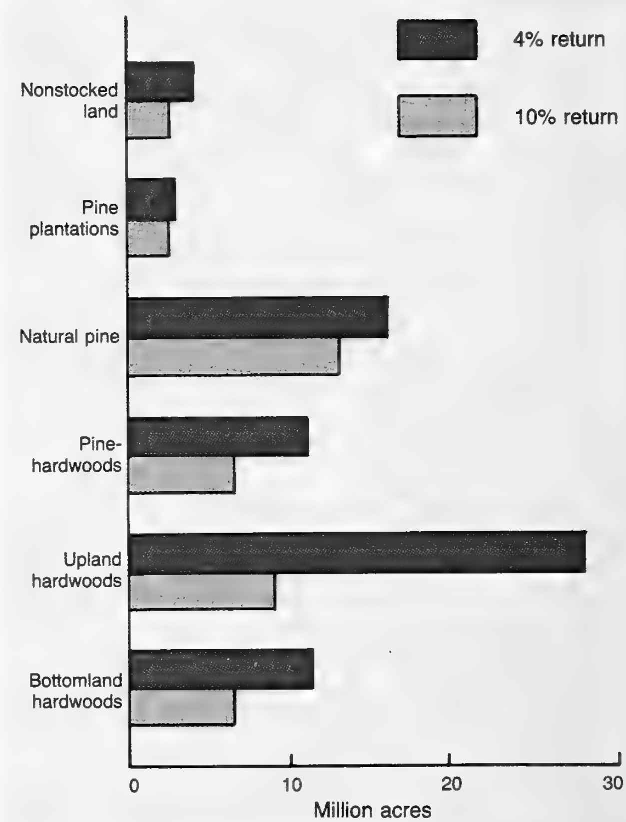


Figure 5.10—Area of timberland with economic opportunities to increase net annual growth in the South, by rate of return and forest management type

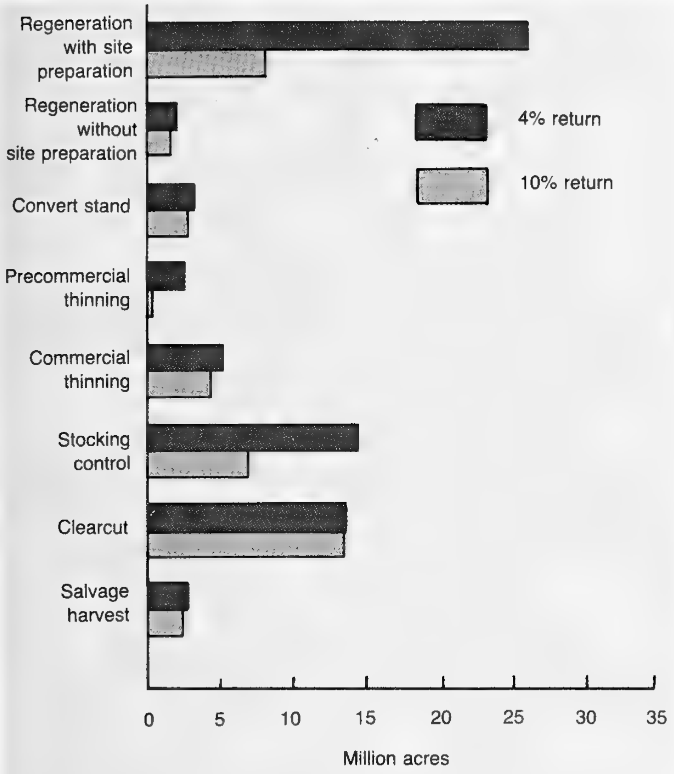


Figure 5.11—Area of timberland with economic opportunities to increase net annual growth in the South, by rate of return and treatment

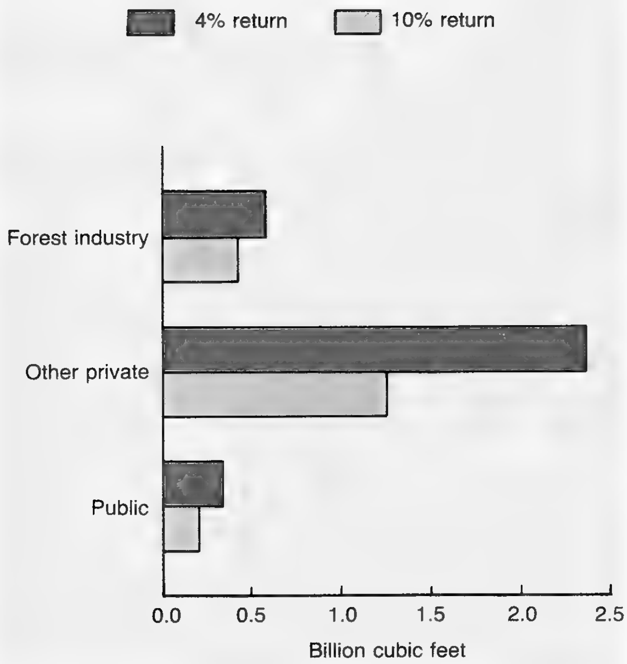


Figure 5.12—Economic opportunities to increase net annual growth on timberland in the South, by rate of return and ownership

much the same as those described above for area and net annual growth.

Economic Opportunities To Increase Net Annual Timber Growth, by State

Economic opportunities to increase net annual growth exist in every State in the South, but they are not equally distributed (tables 5.6 and 5.7). No single reason can be given as the primary determinant of economic opportunities in the States. In some cases, stands are already in reasonably productive condition, and, therefore, the options to increase net annual growth through more intensive management are few. In other cases, markets are relatively weak, and this, too, may lead to a reduced number of economic opportunities.

Detailed data similar to that in appendix tables 5.1–5.6 on the economic opportunities for increasing net annual growth by ownership, forest management type, and treatment are available for each of the 12 Southern States. These

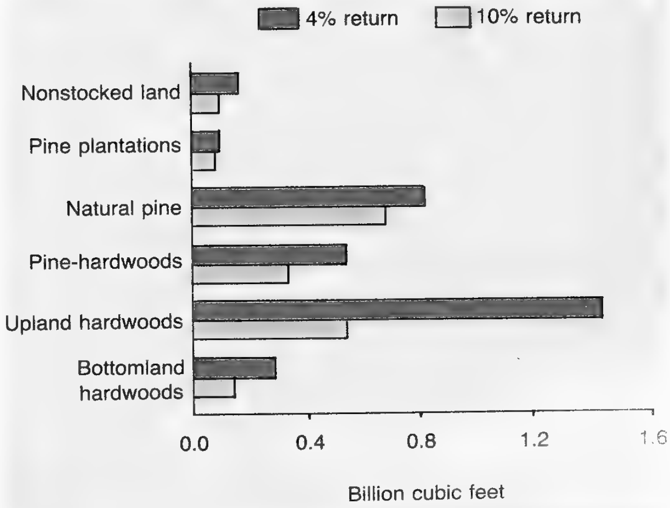


Figure 5.13—Economic opportunities to increase net annual growth on timberland in the South, by rate of return and forest management type

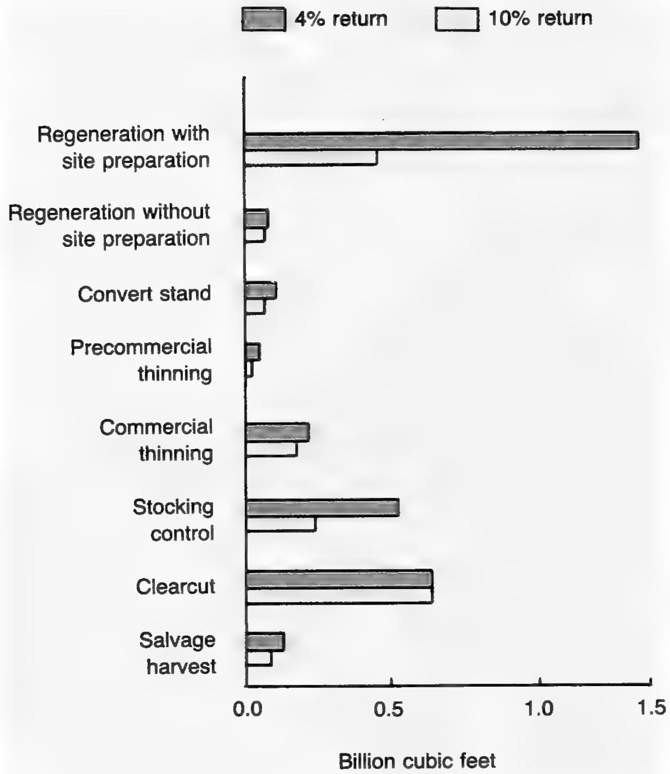


Figure 5.14—Economic opportunities to increase net annual growth on timberland in the South, by rate of return and treatment

data can be obtained by request from J. Michael Vasievich, USDA Forest Service, 1407 South Harrison Road, East Lansing, MI 48823. The highlights of these data are briefly summarized below.

Florida—Florida has 7.8 million acres of timberland needing some treatment to increase productivity. There are economic opportunities that would earn 4 percent or more on 7.2 million acres. Treating these acres would require investments of $645 million. These investments could increase net annual growth by 271 million cubic feet. On a per-acre basis, costs for treatments in Florida average $89, and incremental yields are 37 cubic feet annually.

There are economic opportunities at a 10-percent rate of return on 3 million acres. Implementing these opportunities would cost $170 million and produce 118 million cubic feet of timber annually.

Georgia—Georgia has about 10 million acres of timberland that need treatments; there are opportunities on 9.2 million acres that could earn 4 percent or more. The investments needed for these treatments would be $797 million, and net annual timber growth would increase 419 million cubic feet The average treatment cost is $87 per acre; average yields would go up by 46 cubic feet each year.

About 5.3 million acres in Georgia could be treated and earn 10-percent above inflation. The investment needed to treat these acres is $379 million. Annual timber growth would go up by 256 million cubic feet.

North Carolina—The area of timberland needing treatment in North Carolina is 7.7 million acres. Almost 7 million acres could be treated at a 4-percent rate. These treated acres would produce 321 million cubic feet annually for an investment of $652 million. The average cost per acre is $93, and the average growth increment is 46 cubic feet.

Nearly 4.2 million acres could earn a 10-percent return and produce 204 million cubic feet each year for an investment of $356 million.

South Carolina—This State has 4.9 million acres needing treatment and 4.4 million acres that could earn 4 percent or more. The average cost for these acres is $95, and the average increase in yield is 41 cubic feet annually. The total investment required is $420 million to produce an annual growth increment of 183 million cubic feet.

About 2.2 million acres in South Carolina could earn 10 percent or more on the investments. Treatment of these high-return acres would require $155 million. This investment would increase timber growth by 97 million cubic feet each year.

Virginia—About 6.5 million acres in Virginia need some treatment. Of these acres, 5.7 million could earn 4 percent or more on the investments. The total investment needed for these treatments is $531 million, and the additional yield attainable is about 272 million cubic feet. Average per–acre costs for Virginia are $94, and the average yield increment is 48 cubic feet annually.

Investments on 3 million acres could earn a return of 10 percent or more. These acres would add 150 million cubic feet of net annual growth for an investment of $275 million.

Alabama—This State has the greatest number of acres needing treatment, about 10.6 million. Of that total, 9.6 million acres could earn at least 4 percent. The investment needed for treating this area is $864 million; if treated, it would produce 487 million cubic feet annually. The additional per-acre yield is 51 cubic feet, and the average treatment cost is $90.

At the 10-percent return level, Alabama has 6.1 million acres that could be treated. These acres could produce 327 million cubic feet annually for a cost of $505 million.

Arkansas—In Arkansas, 6.6 million acres need some treatment, and 4.8 million acres could earn a 4-percent or higher rate of return. Treating all of these acres would require $534 million and would yield an additional 213 million cubic feet each year. This amounts to a per-acre cost of $112 and a yearly growth increment of 45 cubic feet per acre.

At the 10-percent return level, there are 2 million acres with economic opportunities in Arkansas. Treatment of these acres would require $184 million and produce 105 million cubic feet of timber per year.

Louisiana—This State has 7.6 million acres of timberland needing treatment, including 6.1 million acres that would yield 4 percent or more if treated. Expenditure of $595 million would be needed to treat these acres; net annual growth would be increased 300 million cubic feet. The average cost for treatment is about $98 per acre, and the average annual yield increment is 50 cubic feet.

At a 10-percent return, 4.4 million acres in Louisiana could be treated with an investment of $370 million. These options would produce 229 million cubic feet of net annual growth.

Mississippi—In Mississippi, about 5.9 million acres of timberland need some treatment to increase productivity. Of these acres, 4.7 million can earn 4 percent or more on the investment needed to treat these acres of $469 million. The expected increase in net annual growth is 246 million cubic feet. On the average, costs per acre are $100, and additional annual yields are 52 cubic feet.

There are 3 million acres in Mississippi that can earn at least 10 percent on investments of $247 million. The added yield from these treatment options is 163 million cubic feet each year.

Oklahoma—Three million acres need some treatment to increase production in Oklahoma, and 2.4 million acres will yield returns of 4 percent or more. Treatment of all these acres would require $301 million and produce 90 million cubic feet of additional timber growth each year. On a per-acre basis, costs average $124, and average incremental annual yields are 37 cubic feet.

Oklahoma has 280,000 acres that could earn a rate of return of 10 percent or more. These treatments would cost $17 million and yield an additional 12 million cubic feet of timber a year.

Tennessee—Tennessee has 6 million acres on which productivity could be increased through more intensive management. Treatments on about 4.6 million of these timberland acres can earn a 4-percent or greater return. The investments necessary for treating these acres total $582 million, and the annual growth increment is about 238 million cubic feet. Treatment costs average $126 per acre, and additional yields average 52 cubic feet annually.

At a 10-percent rate of return, about 890,000 acres qualify for treatment. Some $92 million would be needed to treat these acres, which would produce 49 million cubic feet each year.

Texas—The eastern forested portions of Texas have about 5.1 million acres of timberland that need some treatment to increase productivity. At the 4-percent rate of return, 4.4 million acres qualify for treatment and could produce 207 million cubic feet of additional timber volume each year with investments of $477 million. The average per-acre treatment cost in Texas is $109. The additional timber volume that could be produced per acre annually is 47 cubic feet.

Two million acres qualify at the 10-percent return level in Texas. With treatment, these acres would produce 114 million cubic feet of additional timber each year. Achieving this production would require an investment of $164 million.

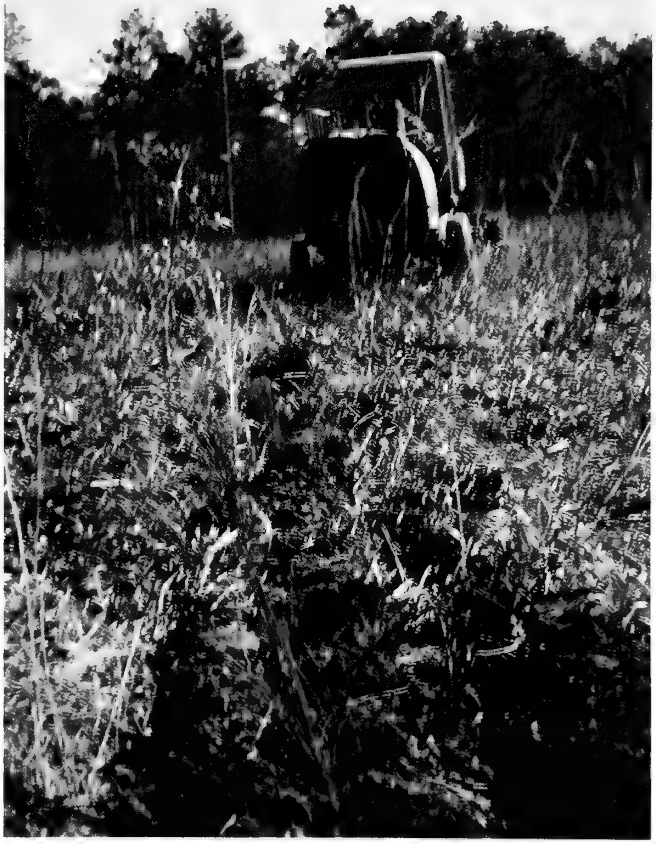
Opportunities To Increase Net Annual Growth on Marginal Cropland and Pasture

Opportunities on Marginal Cropland and Pasture

In addition to the opportunities on timberland described above, there are large potential timber production opportunities on marginal cropland and pasture, including highly erodible cropland, throughout the South. For this analysis, marginal lands were defined as cropland and pasture that could produce a higher financial return in pine plantations than in their best crop or pasture use.

All highly erodible croplands were considered marginal for crop production. In general on these lands the cost of conservation practices and/or reduced yields makes sustained cultivation uneconomic. Records of plots taken for the 1982 National Resources Inventory by the Soil Conservation Service were examined to determine the number of acres that were not prime agricultural lands and that might be considered marginal in potential earnings. These plot records were screened to include only lands in Land Capability Classes 3e, 4e, 6, and 7. Excessively wet lands (class 5) and lands not suitable for planting of trees were excluded from the initial acreage screening.[1]

Benchmark soils were assigned for each Land Capability Class in each Major Land Resource Area in the South. Soil–site associations were used for these benchmark soils to assign potential pine site indexes. Net crop returns per acre were derived from information provided by the Soil Conservation Service for each Major Land Resource Area on normalized costs, yields, and market prices for six major crops (corn, wheat, cotton, soybeans, sorghum, and peanuts). These crop returns excluded land costs and were net of any public price-support programs. Net crop returns were screened to identify the best returning crop for each land class. Acres and crop returns were mapped to each forest survey unit based on the distribution of Major Land Resource Areas falling within each survey unit.



There are nearly 22 million acres of marginal cropland and pasture in the South that would yield higher rates of return to the owners if planted to pine. These lands, if planted, would add to the forest wealth of the South and greatly benefit the economy of the region by increasing timber-based employment and wages and salaries.

Timber returns for planting marginal lands to pine were computed for each timber production region. These returns, like the crop returns, excluded land costs and were expressed on an annual basis by converting capitalized timber earnings to an annual timber rent.

Finally, all acres that could produce higher returns in timber production were considered marginal lands for this portion of the study. With few exceptions, all acres in classes 3e through 7 appear likely to be more profitable for tree planting than for crops, given rising stumpage prices.

[1] Land Capability Classes are designations used by the Soil Conservation Service to rate the suitability of soils for agricultural production from ahigh of 1 to a low of 8. The letter "e" subclass designation indicates soils where excessive erosion is a major limitation to use of the land for crop production. Under the Soil Conservation Service definitions, class 4 soils have very severe limitations for agricultural use that restrict the choice of plants, require very careful management, or both. When these soils are cultivated, careful management is required, and conservation practices are more difficult to apply and maintain. Class 3e lands have less-severe erosion limitations than 4e. Class 6 soils have limitations that make them generally unsuited to cultivation. Some soils in class 6 can be safely used for crops provided unusually intensive management is utilized. Class 7 soils have very severe limitations that make them unsuited to cultivation.

The results, shown in table 5.8, indicate that in the South 22 million acres of cropland and pasture could earn greater returns in pine plantations. If planted to pine, these acres would yield about 2.1 billion cubic feet of additional timber growth per year, about 94 cubic feet per acre per year. This volume exceeds the current net annual growth on pine plantations in the South (1.3 billion cubic feet) by 62 percent.

This cropland and pasture is open land and can be planted with machines. There are no site-preparation or other related costs. As a result, the average cost of establishing pine plantations is much below that on harvested timberland—$62 per acre compared to $129 per acre. It is also much below the average $94 per-acre cost of converting to pine plantations timberland stocked with low-quality trees.

Table 5.8—Area of marginal cropland and pasture,[1] including highly erodible cropland, in the South, the cost of establishing pine plantations on this land, and the resulting net annual timber growth if this land were planted to pine or allowed to revert naturally to forest, by State and region

Region and State	Marginal cropland and pasture	Treatment cost to plant pine	Net annual growth from planted pine	Net annual growth from natural regeneration
	Thousand acres	*Million dollars*	*Million cubic feet*	*Million cubic feet*
Southeast				
Florida	1,354	71.8	127.7	49.1
Georgia	1,864	103.4	175.8	75.6
North Carolina	2,115	129.0	199.5	89.9
South Carolina	745	42.1	70.3	23.1
Virginia	2,745	161.2	258.9	76.9
Total	8,823	507.5	832.2	314.6
South Central				
Alabama	2,456	145.6	231.7	88.0
Arkansas	1,956	145.4	184.5	44.5
Louisiana	521	38.3	49.1	18.4
Mississippi	2,526	173.8	238.3	97.3
Oklahoma	800	54.2	75.5	22.5
Tennessee	3,258	233.0	307.3	130.9
Texas	1,615	98.6	152.3	64.9
Total	13,132	888.9	1,238.7	466.5
Southwide total	21,955	1,396.4	2,070.9	781.1

[1] Cropland and pasture classified by the U.S. Department of Agriculture, Soil Conservation Service in Land Capability Classes 3e, 4e, 6, and 7 that could yield higher rates of return in pine plantations than in crop or pasture use.

Planting of marginal cropland and pasture sites to pine is the most profitable investment option identified throughout the South, even without cost-share payments, because only minimal site preparation is needed. These opportunities also offer the most extensive and cost-effective opportunity for expansion of softwood timber supplies.

Approximately three-fifths of the cropland and pasture that would yield higher rates of return if planted to pine are in the South Central region, and two-fifths are in the Southeast region. Nine of the 12 States in the South have more than a million acres of such land.

The South Central region also accounts for a larger share of the potential increase in net annual growth from the establishment of pine plantations on these lands, 60 percent or 1.2 billion cubic feet (fig. 5.15). The Southeast region's share would be 0.8 billion cubic feet of additional timber growth. The leading States are Tennessee, Virginia, Mississippi, Alabama, and North Carolina, each with net annual growth increments estimated near or in excess of 200 million cubic feet.

Average costs to establish pine plantations tend to be higher in the South Central region than in the Southeast. To plant pine on all marginal cropland and pasture would require an investment of approximately $889 million in the South Central region and $508 million in the Southeast. In terms of average cost per unit increase in net annual growth, Florida and Georgia have some of the best opportunities for timber production on marginal acres in the Southeast. Texas and Alabama, in the South Central region, also have relatively low costs per unit of growth increase.

Average timber returns for plantations established on marginal cropland and pasture in the South are about 11 to 15 percent above inflation on high sites, from 8 to 12 percent on medium sites, and about 5 to 9 percent above inflation on low sites. Actual rates of return, however, depend on location, cost of plantation establishment, and other production factors.

If all of this marginal cropland and pasture were allowed to revert naturally to forest cover, about 781 million cubic feet of timber would eventually be produced per year (table 5.8, fig. 5.15). This growth amounts to an average production of about 36 cubic feet of timber per acre annually, but the direct investment costs would be nil. These estimates include assumptions that some sites would revert

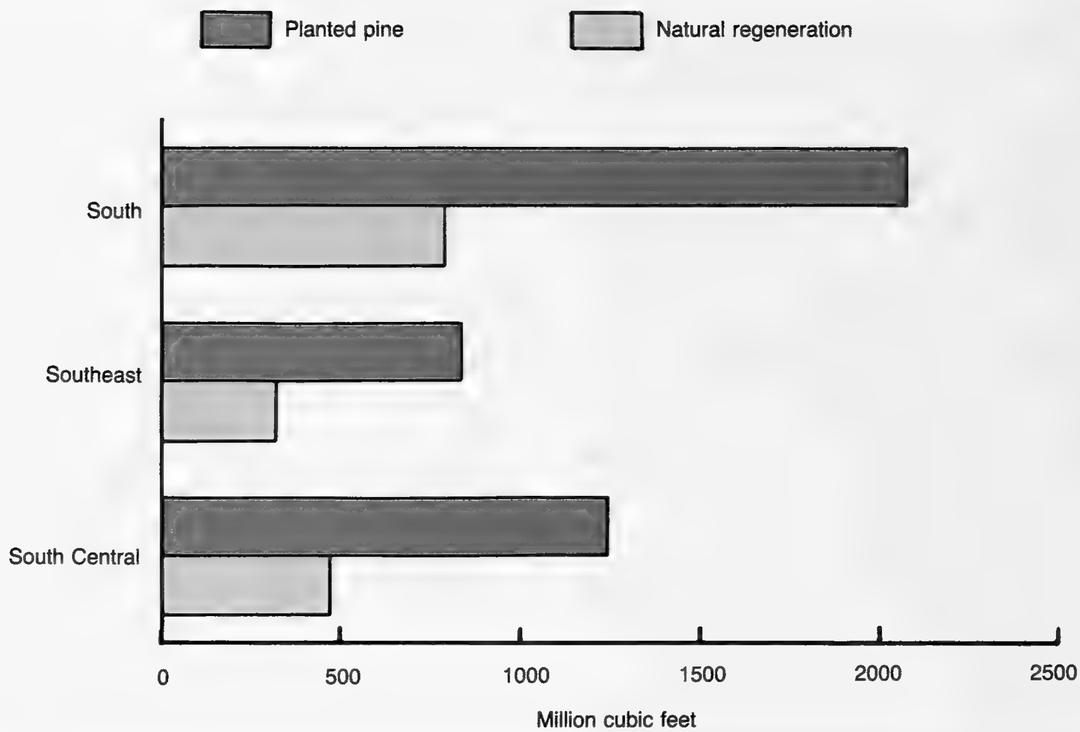


Figure 5.15—Potential net annual growth from planted pine or naturally regenerated pine and hardwoods on all marginal cropland and pasture in the South, by region

If the marginal cropland and pasture in the South were allowed to revert naturally to trees, it would in time grow about 780 million cubic of timber a year. While this is much below the net annual growth that would be attained if the land were planted to pine, the direct investment costs are nil.

to pine while others would become predominantly hardwood stands. For the Southeast region, it was assumed that 70 percent of the sites would revert to pine and 30 percent to upland hardwoods; for the South Central region, 40 percent to pine and 60 percent to upland hardwoods. The regional shares of the net annual growth from naturally regenerated stands are 467 million cubic feet (60 percent) for the South Central States and 315 million cubic feet (40 percent) for States in the Southeast.

Opportunities on Highly Erodible Cropland

Timber production opportunities on highly erodible cropland, included in marginal cropland and pasture, were also examined separately. Estimates of highly erodible cropland acres were based on figures from the Soil Conservation Service on cropland in the South in Land Capability Classes 3e, 4e, 6e, and 7e that would be suitable for planting to trees. On these lands, erosion is a major limitation to keeping the land in cultivation for crops. Cropland acres in these land classes are likely to be eligible for the Conservation Reserve Program.

As shown in table 5.9, there are about 7.7 million acres in the South that may be classified as highly erodible cropland suitable for planting to trees. Most of these acres would be highly productive timber sites, and returns from pine plantations could match or exceed long-term earnings from crops. Approximately 60 percent of this area, 4.6 million acres, is in the South Central region. Two-thirds of the regional total is concentrated in the States of Tennessee, Mississippi, and Alabama. Tennessee has almost 1.3 million acres of highly erodible cropland, and Mississippi and Alabama have 1.0 and 0.9 million acres, respectively. The Southeast region has 3.1 million acres in this category. North Carolina and Virginia account for over 67 percent of this total, with a little more than a million acres each.

More than 836 million cubic feet of timber could be produced annually on the 7.7 million highly erodible acres Southwide. This amount is about two-thirds of the current net annual timber growth on pine plantations in the South. Half a billion cubic feet could be produced in the South Central region and 336 million cubic feet in the Southeast (fig. 5.16).

The capital investments needed to plant pine on the highly erodible cropland in the South would total about $488 million, and the financial returns on these acres would range from 11 to 15 percent across the South. These figures exclude the effects of any cost-share payments under the Conservation Reserve Program.

Table 5.9—Area of highly erodible cropland[1] in the South, the cost of establishing pine plantations on this land, and the resulting net annual timber growth, by State and region

Region and State	Highly erodible cropland	Treatment cost	Net annual growth increment
	Thousand acres	*Million dollars*	*Million cubic feet*
Southeast			
Florida	52	3.3	5.6
Georgia	659	41.5	71.1
North Carolina	1,047	65.9	113.1
South Carolina	299	18.8	32.3
Virginia	1,058	66.7	114.2
Total	3,115	196.2	336.3
South Central			
Alabama	851	53.6	91.9
Arkansas	583	36.7	63.0
Louisiana	75	4.7	8.1
Mississippi	1,022	64.4	110.4
Oklahoma	56	3.5	6.0
Tennessee	1,287	81.1	139.0
Texas	755	47.4	81.5
Total	4,629	291.4	499.9
Southwide total	7,744	487.6	836.2

[1] Cropland classified by the U.S. Department of Agriculture, Soil Conservation Service in land capability classes 3e, 4e, 6e, and 7e that is also suitable for planting to trees.

There are about 8 million acres of highly erodible cropland in the 12 Southern States. If these lands were planted to pine, about 836 million cubic feet of timber could be produced annually. This is enough timber to support about a 17-percent expansion of the present softwood-using industries in the South.

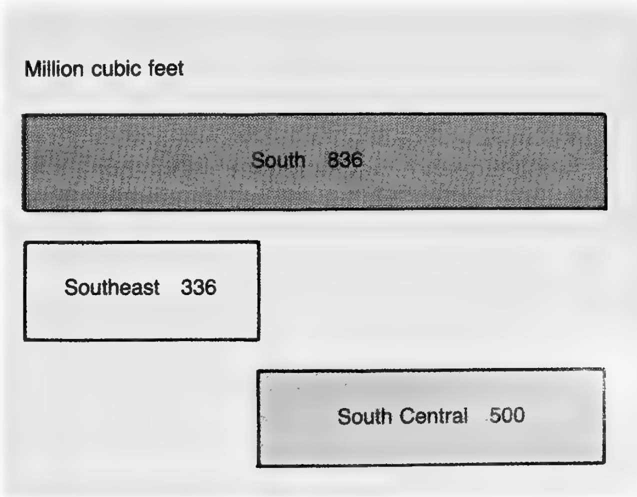


Figure 5.16—Potential net annual growth from pine plantations established on highly erodible cropland in the South, by region

The average cost is $63 per acre, about the same as on economically marginal cropland and pasture and much below the average on harvested timberland.

In summary, net annual timber growth in the South could increase by 2.1 billion cubic feet if pine plantations were established on all of the marginal cropland and pasture, including the highly erodible land identified in this analysis. Total volume is almost two-thirds of the net annual growth potential from utilizing all of the economic opportunities on timberlands. Taken together, opportunities on timberland and cropland and pasture could increase net annual growth in the South by 5.3 billion cubic feet. Most of this increase would be pine growth. This volume, 5.3 billion cubic feet, would represent a 53 percent increase in current net annual growth for all species in the South and would nearly double current net annual growth for softwoods (fig. 5.17).

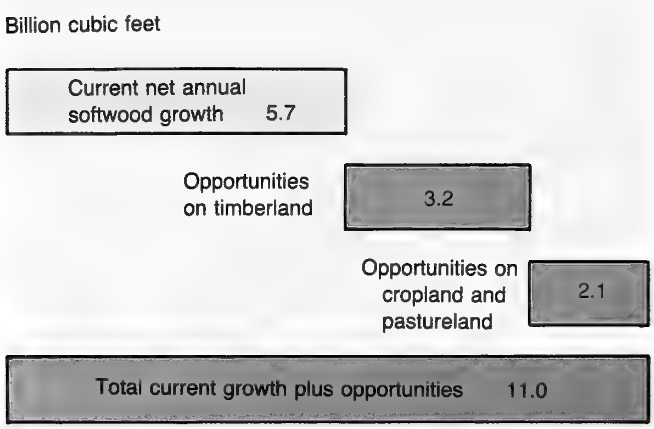


Figure 5.17—Economic opportunities to increase current net annual timber growth in the South

A Qualified View of the Opportunities for Increasing Timber Supplies

In appraising the economic opportunities for increasing timber supplies presented in this chapter, readers should keep in mind two things. First, these opportunities are estimates based largely on the judgments of experts drawn from universities, forest industries, the Forest Service, and State forestry agencies. Second, the estimates include all the timberland in the defined stand conditions without regard to the size or accessibility of tracts, the objectives of the owners, or publicly imposed environmental constraints.

In view of these limitations and constraints, it is obvious that the estimates are not an exact measure of the economic opportunities that exist in the South. Nonetheless, even after allowances for possible uncertainties, it is evident that very large opportunities do exist to invest in timber management practices that will yield good rates of return and result in major increases in the Nation's timber supplies. It is also clear that the potential exists to dramatically change the timber outlook in the South in the next half-century. In that period, with intensified management, enough timber could be produced to greatly diminish or eliminate the adverse social, economic, and renewable resource effects that are likely with the base projections. With the implementation of the economic opportunities on timberland and marginal cropland and pasture, including the highly erodible cropland, it would also be possible to sustain indefinitely the forestry sector in the South, including employment and wages and salaries.

But only part of these opportunities are likely to be realized. Studies prepared in the late 1960's and the late 1970's and this analysis show that large opportunities continue to be unutilized. This may be due in large part to market imperfections in the forestry sector. The market system that so effectively guides the production of most goods and services works in only a limited way in increasing timber supplies.

Market Imperfections—Causes and Implications

The best quantitative measure of market imperfection for timber supplies is the coefficient of price elasticity of supply. This coefficient is a measure of the percentage change in stumpage (timber) supply resulting from a percentage change in stumpage prices. For example, with a 10-percent increase in stumpage prices, if stumpage supplies increase 3 percent, the coefficient of price elasticity would be 0.3. In simpler terms, it is a measure of the responsiveness of forest owners to price changes. The further the coefficient falls below 1.0, the more unresponsive or imperfect the market.

Relatively few studies of the price elasticity of stumpage supply have been made. The fundings of the major ones are summarized in Cubbage and Haynes' report "Evaluation of Market Responses to Timber Scarcity Problems" (referenced at the start of chapter 2). These studies have shown that the price elasticities of stumpage supply are inelastic, generally ranging below 0.4. This means that the free market system does not work very well for timber supply—it is to a large degree unresponsive to price changes.

There are five major causes of imperfection in timber markets:

1. Failure of the stumpage market price to reflect all benefits associated with forests, such as the provision of wildlife habitat, scenic beauty, and improved water quality; and all costs such as the pollution resulting from the use of chemicals and fires.

2. The short time-preference of individual landowners, which constrains investments in management options yielding rewards after an extended period of time.

3. Lack of investment capital and market and management knowledge among private timber owners.

4. Ownership objectives that limit or constrain timber production.

5. Limited competition among timber buyers.

The market system also has no means of adequately recognizing societal interests in the protection of the forest environment and the maintenance of the resource base and the productive capability of forest land.

Market imperfections and the associated low price elasticity of stumpage supply have been the chief cause of the increases in the relative prices of stumpage and most timber products that have taken place for decades, and even centuries in the case of lumber. These longrun rising real prices are simply another quantitative measure of the low price elasticity of stumpage supply. This low price elasticity is also reflected in rapid changes in the prices of stumpage and many timber products. Limited supply responses, along with inelastic demand for many timber products, have been the chief cause of the large cyclical swings in stumpage and lumber prices referenced in chapter 2 and shown in the historical data in the associated appendix tables.

Rising real prices and price cycles have important and adverse impacts on the economy and the environment. In response to the need to constrain these effects and to protect the forest environment and the productive capability of forest land and the timber resource, society has developed an array of policies and programs to increase forest productivity. These include the public and private programs of protection, research, education, technical and financial assistance, public ownership, and special tax laws and forest practices acts that have been described in the preceding chapters. Although it has not been recognized in any of the supporting legislation, and in only a limited way in the forestry literature, all of these things are means of dealing with market imperfections.

By any standard, these policies and programs have worked. They have resulted in the regeneration of the second and third forests and made possible the development and growth of the forest industries, which now constitute such an important part of the South's economic base. The programs are also efficient—the benefits exceed the cost—and they are effective in increasing the income of timberland owners.

But they are not enough. If future employment and income in the forest industries are to be sustained, action must be taken to expand both public and private programs that are effective in increasing timber supplies. This can be done in a variety of ways, but market forces must be supplemented. There is simply no alternative if the timber resource is to maintain its important place in the economy of the South.

Literature Cited

McClure, J.P.; Knight, H. 1984. Empirical yields of timber and forest biomass in the Southeast. Res. Pap. SE-245. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 75 p.

Norris, F.W. 1985. Timber Mart–South. 10(1–12).

Appendix 1

Table 1.1—Total land area, cropland, and pasture (1982) and timberland (1985) in the South, by region and State

Region and State	Total land area	Timberland Acreage	Timberland Proportion[1]	Cropland Acreage	Cropland Proportion[1]	Pasture Acreage	Pasture Proportion[1]	All other land Acreage	All other land Proportion[1]
	Thousand acres	*Thousand acres*	*Percent*	*Thousand acres*	*Percent*	*Thousand acres*	*Percent*	*Thousand acres*	*Percent*
Southeast									
Virginia	25,410	15,436	60.7	3,397	13.4	3,392	13.3	3,185	12.5
North Carolina	31,227	18,358	58.8	6,695	21.4	1,980	6.3	4,194	13.4
South Carolina	19,323	12,230	63.3	3,579	18.5	1,208	6.3	2,306	11.9
Georgia	37,146	23,535	63.4	6,568	17.7	2,977	8.0	4,066	10.9
Florida	34,657	15,337	44.3	3,557	10.3	4,273	12.3	11,490	33.2
Total	147,763	84,896	57.5	23,796	16.1	13,830	9.4	25,241	17.1
South Central									
Alabama	32,458	21,577	66.5	4,510	13.9	3,817	11.8	2,554	7.9
Mississippi	30,176	16,072	53.3	7,415	24.6	3,975	13.2	2,714	9.0
Tennessee	26,323	12,937	49.1	5,592	21.2	5,356	20.3	2,438	9.3
Arkansas	33,334	15,950	47.8	8,102	24.3	5,794	17.4	3,488	10.5
Louisiana	28,207	13,797	48.9	6,409	22.7	2,368	8.4	5,633	20.0
East Texas[2]	22,192	12,187	54.9	1,565	7.1	6,813	30.7	1,627	7.3
East Oklahoma[2]	10,513	4,748	45.2	466	4.4	2,950	28.1	2,349	22.3
Total	183,203	97,268	52.8	34,059	18.6	31,073	17.0	20,803	11.4
Southwide total	330,966	182,164	55.0	57,855	17.5	44,903	13.6	46,044	13.9

[1] Acreage in this category as a percentage of total land area.

[2] Estimated for the 43 counties in eastern Texas and the 18 counties in eastern Oklahoma covered by USDA Forest Service forest survey.

Note: Data may not add to totals because of rounding.

Sources: Total land area, cropland, and pasture: U.S. Department of Agriculture, Soil Conservation Service, National Resources Inventory, 1982. Timberland area: U.S. Department of Agriculture, Forest Service, 1985.

Table 1.2—Estimated volume of roundwood timber products in the South, by product, softwoods and hardwoods, region, and State, 1984

Million cubic feet

Region and State	All products			Sawlogs			Veneer logs		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
Southeast									
Virginia	595.6	227.3	368.3	224.5	92.5	131.9	19.2	15.1	4.2
North Carolina	742.4	413.4	329.0	272.0	180.0	92.0	46.7	38.0	8.7
South Carolina	562.1	394.5	167.6	206.0	170.5	35.5	53.3	44.8	8.4
Georgia	1,232.4	1,021.7	210.8	514.0	448.0	66.0	83.0	70.0	13.0
Florida	468.6	411.2	57.4	138.7	133.4	5.3	31.3	26.5	4.7
Total	3,601.2	2,468.0	1,133.2	1,355.1	1,024.4	330.7	233.5	194.4	39.0
South Central									
Alabama	1,031.1	684.7	346.4	320.5	250.1	70.4	83.8	73.7	10.1
Mississippi	828.5	530.3	298.3	352.0	260.1	91.8	54.4	49.5	4.8
Tennessee	280.8	60.7	220.1	123.6	16.9	106.7	0.9	0	0.9
Arkansas	466.7	310.2	156.4	246.6	188.9	57.7	34.5	33.3	1.2
Louisiana	651.5	472.2	179.3	170.0	114.8	55.2	134.2	133.0	1.3
Texas	602.7	470.0	132.7	211.0	175.0	36.0	123.7	122.0	1.7
Oklahoma	80.2	53.1	27.0	33.9	23.9	10.0	4.5	4.5	([2])
Total	3,941.5	2,581.3	1,360.2	1,457.6	1,030.0	427.9	436.0	416.1	19.9
Southwide total	7,542.7	5,049.3	2,493.4	2,812.7	2,054.2	758.5	669.4	610.5	59.0

Region and State	Pulpwood			Other industrial products[1]			Fuelwood		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
Southeast									
Virginia	211.7	102.6	109.2	7.8	5.5	2.4	132.3	11.6	120.7
North Carolina	287.1	175.6	111.4	6.9	1.1	5.7	129.9	18.7	111.2
South Carolina	240.2	169.5	70.7	6.3	6.3	0	56.4	3.4	53.0
Georgia	545.4	471.7	73.8	22.0	22.0	0	68.0	10.0	58.0
Florida	261.9	240.2	21.7	9.9	9.9	0	26.8	1.1	25.7
Total	1,546.3	1,159.6	386.8	52.9	44.8	8.1	413.4	44.8	368.6
South Central									
Alabama	559.7	343.8	216.0	16.5	14.3	2.2	50.6	2.8	47.7
Mississippi	341.6	200.5	141.1	21.2	18.6	2.6	59.4	1.5	57.9
Tennessee	80.5	43.0	37.6	3.2	0.2	3.0	72.7	0.7	72.0
Arkansas	127.2	76.9	50.3	11.0	10.0	1.0	47.3	1.1	46.2
Louisiana	301.3	214.1	87.2	9.2	9.2	0	36.8	1.1	35.6
Texas	224.0	165.0	59.0	5.2	5.2	0	38.8	2.8	36.0
Oklahoma	19.6	15.5	4.1	9.3	9.0	0.3	12.8	0.2	12.6
Total	1,654.0	1,058.8	595.2	75.6	66.5	9.1	318.3	10.1	308.1
Southwide total	3,200.4	2,218.4	982.0	128.5	111.3	17.2	731.6	54.9	676.7

[1] Includes products such as poles and piling, fenceposts, mine timbers, cooperage logs, and logs and bolts used for shingles, excelsior, and an assortment of other wood items.

[2] Less than 50,000 cubic feet.

Note: Data may not add to totals because of rounding.

Table 1.3—Estimated stumpage value of roundwood timber products in the South, by product, softwoods and hardwoods, region, and State, 1984

Million dollars

Region and State	All products			Sawlogs			Veneer logs		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
Southeast									
Virginia	148.8	81.3	67.6	88.6	48.6	40.0	16.7	13.0	3.7
North Carolina	241.0	199.2	41.8	160.7	139.0	21.7	40.9	34.6	6.3
South Carolina	231.3	211.2	20.1	136.1	127.0	9.0	37.9	34.9	3.0
Georgia	585.9	557.4	28.5	344.7	330.2	14.5	68.1	61.5	6.6
Florida	240.1	234.3	5.8	114.5	113.6	0.9	25.1	23.2	1.8
Total	1,447.1	1,283.3	163.8	844.6	758.5	86.2	188.6	167.2	21.4
South Central									
Alabama	376.9	332.9	44.0	194.9	176.0	18.8	74.8	68.7	6.1
Mississippi	280.1	244.0	36.2	173.0	152.4	20.6	46.5	43.7	2.8
Tennessee	79.1	12.3	66.9	65.3	7.7	57.6	2.0	0	2.0
Arkansas	240.7	220.6	20.2	172.4	158.8	13.6	34.0	33.4	0.6
Louisiana	285.8	264.8	21.0	96.1	83.0	13.0	127.1	126.4	0.7
Texas	323.3	305.9	17.3	163.8	152.3	11.5	105.5	104.9	0.6
Oklahoma	32.3	28.1	4.2	19.0	15.8	3.1	3.8	3.8	(2)
Total	1,618.3	1,408.6	209.7	884.4	746.1	138.2	393.7	380.9	12.8
Southwide total	3,065.4	2,691.9	373.5	1,729.0	1,504.6	224.4	582.3	548.2	34.1

Region and State	Pulpwood			Other industrial products[1]			Fuelwood		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
Southeast									
Virginia	20.8	14.2	6.6	3.9	3.8	0.1	18.8	1.7	17.2
North Carolina	27.9	23.0	4.9	2.8	1.3	1.5	8.7	1.2	7.4
South Carolina	47.7	43.2	4.5	5.8	5.8	0	3.8	0.2	3.5
Georgia	146.9	143.3	3.6	21.7	21.7	0	4.6	0.7	3.9
Florida	91.5	90.1	1.4	7.3	7.3	0	1.8	0.1	1.7
Total	334.8	313.9	21.0	41.5	39.9	1.6	37.6	3.9	33.7
South Central									
Alabama	88.1	73.0	15.1	15.7	15.0	0.7	3.4	0.2	3.2
Mississippi	44.0	35.9	8.1	12.7	11.8	0.8	4.0	0.1	3.9
Tennessee	5.7	4.5	1.2	1.3	0.1	1.2	4.9	(2)	4.8
Arkansas	20.0	17.4	2.6	11.2	10.9	0.3	3.2	0.1	3.1
Louisiana	50.1	45.2	4.9	10.1	10.1	0	2.5	0.1	2.4
Texas	48.2	45.4	2.9	3.2	3.2	0	2.6	0.2	2.4
Oklahoma	2.7	2.5	0.1	6.0	5.9	0.1	0.9	(2)	0.8
Total	258.8	223.8	34.9	60.1	57.0	3.1	21.3	0.7	20.6
Southwide total	593.6	537.7	55.9	101.6	96.9	4.8	58.9	4.6	54.3

[1] Includes products such as poles and piling, fenceposts, mine timbers, cooperage logs, and logs and bolts used for shingles, excelsior, and an assortment of other wood items.

[2] Less than $50,000.

Note: Data may not add to totals because of rounding.

Table 1.4—Estimated value at local points of delivery of roundwood timber products in the South, by product, softwoods and hardwoods, region, and State, 1984

Million dollars

Region and State	All products			Sawlogs			Veneer logs		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
Southeast									
Virginia	515.5	181.2	334.3	189.9	77.5	112.4	32.2	17.2	15.1
North Carolina	572.8	374.5	198.3	266.9	203.4	63.5	58.8	49.4	9.4
South Carolina	467.7	370.0	97.7	215.0	193.5	21.5	58.3	52.4	5.9
Georgia	1,003.0	885.3	117.7	480.3	445.8	34.5	95.0	82.3	12.6
Florida	389.7	358.2	31.6	154.0	151.9	2.1	32.8	29.5	3.4
Total	2,948.8	2,169.2	779.5	1,306.0	1,072.1	233.9	277.1	230.8	46.4
South Central									
Alabama	737.7	569.2	168.5	282.4	240.6	41.8	102.7	92.1	10.6
Mississippi	593.0	428.1	164.9	280.1	223.8	56.3	62.5	58.5	4.1
Tennessee	264.6	33.4	231.2	172.6	12.6	160.0	4.0	0	4.0
Arkansas	413.2	325.1	88.1	250.8	217.2	33.6	44.9	44.1	0.9
Louisiana	528.0	428.1	99.9	148.6	112.1	36.4	168.6	167.3	1.3
Texas	569.0	490.9	78.1	248.7	220.7	28.0	153.4	152.0	1.4
Oklahoma	64.2	45.9	18.4	30.4	22.4	7.9	5.3	5.3	(2)
Total	3,169.7	2,320.7	849.0	1,413.4	1,049.4	364.0	541.5	519.3	22.3
Southwide total	6,118.5	4,489.9	1,628.5	2,719.4	2,121.5	597.9	818.7	750.0	68.7

Region and State	Pulpwood			Other industrial products[1]			Fuelwood		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
Southeast									
Virginia	127.6	67.3	60.2	7.4	6.7	0.8	158.4	12.6	145.8
North Carolina	153.0	107.1	45.9	5.9	1.9	4.0	88.3	12.7	75.6
South Carolina	147.8	113.6	34.2	8.3	8.3	0	38.4	2.3	36.1
Georgia	349.0	317.8	31.1	32.4	32.4	0	46.4	7.0	39.4
Florida	174.4	165.8	8.6	10.3	10.3	0	18.2	0.7	17.5
Total	951.7	771.6	180.1	64.2	59.4	4.8	349.7	35.3	314.4
South Central									
Alabama	294.8	213.0	81.8	23.3	21.6	1.8	34.4	1.9	32.5
Mississippi	188.9	125.8	63.2	21.1	19.1	2.0	40.4	1.0	39.4
Tennessee	35.4	20.2	15.2	3.2	0.1	3.0	49.4	0.5	49.0
Arkansas	69.3	47.9	21.4	16.0	15.2	0.8	32.2	0.8	31.4
Louisiana	172.2	134.3	37.9	13.6	13.6	0	25.0	0.8	24.2
Texas	135.5	111.3	24.2	5.0	5.0	0	26.4	1.9	24.5
Oklahoma	10.6	9.0	1.6	9.2	9.0	0.2	8.7	0.1	8.6
Total	906.8	661.5	245.3	91.5	83.7	7.9	216.4	6.9	209.5
Southwide total	1,858.5	1,433.1	425.4	155.7	143.1	12.7	566.1	42.2	523.9

[1] Includes products such as poles and piling, fenceposts, mine timbers, cooperage logs, and logs and bolts used for shingles, excelsior, and an assortment of other wood items.

[2] Less than $50,000.

Note: Data may not add to totals because of rounding.

Table 1.5—Estimated value at local points of delivery of roundwood timber products[1] and other agricultural crops[2] in the South, by region and State, 1984

Region and State	Value of other agricultural crops	Value of timber products	
	Million dollars	*Million dollars*	*Percent*[3]
Southeast			
Virginia	863	515	60
North Carolina	2,224	573	26
South Carolina	732	468	64
Georgia	1,664	1,003	60
Florida	2,431	390	16
Total	7,915	2,949	37
South Central			
Alabama	774	738	95
Mississippi	1,253	593	47
Tennessee	1,157	265	23
Arkansas	1,658	413	25
Louisiana	1,204	528	44
Texas	3,832	569	15
Oklahoma	1,135	64	6
Total	11,013	3,170	29
Southwide total	18,928	6,118	32

[1] Includes logs, bolts, or other round sections cut from trees.

[2] Includes all field crops, fruits and nuts, and vegetables of commercial significance.

[3] Value of timber products as a percentage of all other agricultural crops.

Note: Data may not add to totals because of rounding.

Table 1.6—Estimated values at local points of delivery of roundwood timber products and the highest valued agricultural crops for regions and States in the South, 1984

Million dollars

Southeast		Florida		Georgia	
Timber	**2,949**	Fruits and nuts	1,183	**Timber**	**1,003**
Tobacco	1,654	Vegetables	546	Peanuts	622
Fruits and nuts	1,421	**Timber**	**390**	Corn	242
Corn	950	Sugarcane	365	Soybeans	238
Peanuts	890	Potatoes	71	Tobacco	156
Soybeans	869				
North Carolina		South Carolina		Virginia	
Tobacco	1,067	**Timber**	**468**	**Timber**	**515**
Timber	**573**	Tobacco	191	Tobacco	207
Corn	408	Soybeans	178	Corn	163
Soybeans	276	Corn	96	Soybeans	128
Peanuts	122	Fruits and nuts	63	Peanuts	71
South Central		Alabama		Arkansas	
Timber	**3,170**	**Timber**	**738**	Soybeans	604
Cotton	2,351	Peanuts	185	Rice	450
Soybeans	2,018	Soybeans	174	**Timber**	**413**
Wheat	1,602	Cotton	134	Wheat	203
Rice	883	Corn	71	Cotton	181
Sorghum	857				
Louisiana		Mississippi		Oklahoma	
Timber	**528**	**Timber**	**593**	Wheat	641
Soybeans	401	Cotton	479	**Timber**	**64**
Cotton	305	Soybeans	464	Peanuts	51
Rice	180	Wheat	85	Cotton	50
Sugarcane	121	Rice	73	Sorghum	45
Tennessee		Texas			
Soybeans	286	Cotton	1,098		
Tobacco	277	**Timber**	**569**		
Timber	**265**	Sorghum	540		
Corn	190	Wheat	509		
Cotton	103	Corn	437		

Table 1.7—Type II output, income, and employment multipliers for States in the South, by type of forest industry, 1984[1]

	Output		Income		Employment	
	Lumber and wood products	Pulp and paper products	Lumber and wood products	Pulp and paper products	Lumber and wood products	Pulp and paper products
Southeast						
Florida	2.97*	3.03*	2.70*	2.56*	2.50	3.10
Georgia	2.43*	2.36*	2.10*	2.35*	1.82	2.80
North Carolina	1.57	1.53	1.94	1.91	1.90	2.17
South Carolina	2.43	2.36	2.10	2.35	1.82	2.80
Virginia	1.57*	1.53*	1.94*	1.91*	1.90*	2.17*
South Central						
Alabama	2.66*	2.42*	2.51*	2.85*	2.29*	3.58*
Arkansas	2.42	2.36	2.32*	2.32*	2.27*	2.27*
Louisiana	2.62	2.48	2.86	2.65	2.29	3.24
Mississippi	2.02*	1.97*	2.01*	1.96*	2.23*	2.60*
Oklahoma	3.58*	3.38*	3.19*	4.88*	3.94*	10.14*
Tennessee	1.25*	1.50*	1.35	1.45	1.24*	1.48*
Texas	2.58*	2.53*	3.21*	2.45*	2.29*	2.91*

[1] Numbers marked by an asterisk are taken from input–output models developed for individual States since 1964. The others are estimates developed by Flick (1986 unpubl.). These multipliers reflect direct, indirect, and induced effects of a one-unit change in output, income, or employment.

Source: Flick (1986 unpubl.).

Table 1.8—Number of establishments, employment, wages and salaries, value of shipments, and value added for all manufacturing and for forest industries[1] in the South, by region and State, 1982

Region and State	Establishments			Employment			Wages and salaries			Value of shipments			Value added by manufacture		
	All manu-facturing	Forest industries		All manu-facturing	Forest industries		All manu-facturing	Forest industries		All manu-facturing	Forest industries		All manu-facturing	Forest industries	
	Number	*Number*	*Percent*[2]	*Thousand employees*	*Thousand employees*	*Percent*[2]	*Million dollars*	*Million dollars*	*Percent*[2]	*Million dollars*	*Million dollars*	*Percent*[2]	*Million dollars*	*Million dollars*	*Percent*[2]
Southeast															
Virginia	5,569	1,404	25.2	391.1	52.7	13.5	6,649.0	738.6	11.1	36,802.7	3,807.1	10.3	17,255.6	1,685.7	9.8
North Carolina	10,134	2,554	25.2	799.1	121.7	15.2	11,723.5	1,590.2	13.6	64,250.5	7,486.9	11.7	28,510.2	3,315.1	11.6
South Carolina	4,205	1,087	25.9	367.4	28.8	7.8	5,538.6	468.2	8.5	27,831.3	2,987.4	10.7	12,216.9	1,116.2	9.1
Georgia	8,535	2,047	24.0	503.2	60.5	12.0	7,912.2	1,021.1	12.9	48,076.3	6,812.0	14.2	19,212.2	2,585.5	13.5
Florida	13,723	1,811	13.2	454.4	40.0	8.8	7,773.2	644.0	8.3	38,683.3	3,612.2	9.3	18,111.8	1,243.2	6.9
Total	42,166	8,903	21.1	2,515.2	303.7	12.1	39,596.5	4,462.1	11.3	215,644.1	24,705.6	11.5	95,306.7	9,945.7	10.4
South Central															
Alabama	5,528	1,810	32.7	329.6	46.9	14.2	5,234.4	624.3	15.7	29,794.3	5,303.5	17.8	12,045.7	2,358.2	19.6
Mississippi	3,126	1,094	35.0	201.7	37.2	18.4	2,880.8	532.6	18.5	19,488.0	2,901.3	14.9	7,824.9	1,137.4	14.5
Tennessee	6,417	1,191	18.6	461.6	46.0	10.0	7,377.7	647.7	8.8	40,795.2	3,593.1	8.8	17,841.6	1,636.5	9.2
Arkansas	3,313	1,023	30.9	189.8	32.4	17.1	2,823.7	520.4	18.4	19,746.5	3,433.7	17.4	7,755.3	1,282.9	16.5
Louisiana	4,107	830	20.2	202.0	22.3	11.0	4,304.2	433.9	10.1	57,058.1	2,852.8	5.0	11,754.6	991.4	8.4
Texas	20,288	1,743	8.6	1,058.4	60.5	5.7	21,436.2	958.1	4.5	171,656.9	5,471.7	3.2	53,361.4	2,046.5	3.8
Oklahoma	4,169	281	6.7	197.4	7.8	4.0	4,023.3	131.8	3.3	23,146.1	934.3	4.0	8,161.8	317.2	3.9
Total	46,948	7,972	17.0	2,640.5	253.1	9.6	48,080.3	4,048.8	8.4	361,685.1	24,490.4	6.8	118,745.3	9,770.1	8.2
Southwide total	89,114	16,875	18.9	5,155.7	556.8	10.8	87,676.8	8,510.9	9.7	577,329.2	49,196.0	8.5	214,052.0	19,715.8	9.2

[1] Logging contractors and manufacturers whose primary products include rough and dressed lumber, flooring, dimension stock, railroad ties, furniture frames, wood lath, wood chips, pulp, paper, paperboard, building paper and board, veneer, plywood, millwork, wood furniture and fixtures, wood containers, pallets, prefabricated wood structures and mobile homes, shingles, excelsior, particleboard, gums and wood chemicals, wood preserving, and converted paper and paperboard products.

[2] Forest industries figure as a percentage of all manufacturing.

Note: Data may not add to totals because of rounding.

Source: Derived from data published by the U.S. Department of Commerce, Bureau of the Census, Census of Manufactures, 1982. For categories where the Bureau of the Census withheld data to avoid disclosure of information about particular companies, estimates were made based on approximate employment figures, industry averages, and information available on closely related industries.

Table 1.9—Number of establishments, employment, wages and salaries, value of shipments, and value added by manufacture in the forest industries in the South, by region, State, and type of industry, 1982

Region, State and type of forest industry	Establishments	Employment	Wages and salaries	Value of shipments	Value added by manufacture
	Number	*Thousand employees*	*Million dollars*	*Million dollars*	*Million dollars*
Southeast					
Virginia					
Logging and sawmills[1]	884	8.7	89.3	447.3	161.9
Plywood, veneer, and wood products[2]	303	10.8	145.0	783.2	284.5
Wood furniture and fixtures[3]	116	19.5	206.0	747.7	385.4
Pulp, paper, and board mills[4]	13	6.8	177.5	1,070.2	567.9
Paper and paperboard products[5]	88	6.8	120.8	758.8	286.1
Total, all forest industries	1,404	52.7	738.6	3,807.1	1,685.7
North Carolina					
Logging and sawmills[1]	1,309	14.8	168.1	950.4	306.3
Plywood, veneer, and wood products[2]	535	17.3	213.8	1,090.2	432.2
Wood furniture and fixtures[3]	535	69.4	784.6	2,921.5	1,525.7
Pulp, paper, and board mills[4]	12	8.7	233.6	1,344.4	567.0
Paper and paperboard products[5]	163	11.6	190.0	1,180.5	483.9
Total, all forest industries	2,554	121.7	1,590.2	7,486.9	3,315.1
South Carolina					
Logging and sawmills[1]	776	7.0	84.5	597.4	174.1
Plywood, veneer, and wood products[2]	195	6.4	83.4	518.9	156.2
Wood furniture and fixtures[3]	40	3.6	42.6	156.7	86.0
Pulp, paper, and board mills[4]	9	4.5	122.4	699.5	268.3
Paper and paperboard products[5]	67	7.3	135.3	1,014.9	431.6
Total, all forest industries	1,087	28.8	468.2	2,987.4	1,116.2
Georgia					
Logging and sawmills[1]	1,303	12.7	144.2	922.1	312.2
Plywood, veneer, and wood products[2]	411	14.8	201.1	1,271.7	443.9
Wood furniture and fixtures[3]	133	5.1	53.1	208.3	105.3
Pulp, paper, and board mills[4]	25	12.7	344.7	2,342.8	899.7
Paper and paperboard products[5]	175	15.3	278.0	2,067.1	824.5
Total, all forest industries	2,047	60.5	1,021.1	6,812.0	2,585.5
Florida					
Logging and sawmills[1]	503	5.3	65.3	471.2	120.1
Plywood, veneer, and wood products[2]	813	14.4	195.6	931.7	339.4
Wood furniture and fixtures[3]	334	5.0	57.2	195.8	108.9
Pulp, paper, and board mills[4]	10	6.8	181.1	1,090.9	357.1
Paper and paperboard products[5]	151	8.5	144.7	922.6	317.7
Total, all forest industries	1,811	40.0	644.0	3,612.2	1,243.2
Total, Southeast Region					
Logging and sawmills[1]	4,775	48.5	551.4	3,388.4	1,074.6
Plywood, veneer, and wood products[2]	2,257	63.7	838.9	4,595.7	1,656.2
Wood furniture and fixtures[3]	1,158	102.6	1,143.5	4,230.0	2,211.3
Pulp, paper, and board mills[4]	69	39.5	1,059.3	6,547.8	2,660.0
Paper and paperboard products[5]	644	49.5	868.8	5,943.9	2,343.8
Total, all forest industries	8,903	303.7	4,462.1	24,705.6	9,945.7

Table 1.9—Number of establishments, employment, wages and salaries, value of shipments, and value added by manufacture in the forest industries in the South, by region, State, and type of industry, 1982—Continued

Region, State and type of forest industry	Establishments	Employment	Wages and salaries	Value of shipments	Value added by manufacture
	Number	*Thousand employees*	*Million dollars*	*Million dollars*	*Million dollars*
South Central					
Alabama					
Logging and sawmills[1]	1,294	11.6	131.2	781.0	252.7
Plywood, veneer, and wood products[2]	317	11.1	148.9	821.8	290.4
Wood furniture and fixtures[3]	114	5.3	56.5	222.9	110.2
Pulp, paper, and board mills[4]	17	14.7	409.2	2,618.8	1,256.7
Paper and paperboard products[5]	68	4.1	78.5	859.0	448.2
Total, all forest industries	1,810	46.9	824.3	5,303.5	2,358.2
Mississippi					
Logging and sawmills[1]	738	10.2	119.4	692.6	238.1
Plywood, veneer, and wood products[2]	191	9.0	125.7	681.9	256.9
Wood furniture and fixtures[3]	118	10.8	126.7	633.4	296.6
Pulp, paper, and board mills[4]	8	4.0	107.7	575.8	205.1
Paper and paperboard products[5]	39	3.1	53.1	317.7	140.7
Total, all forest industries	1,094	37.2	532.6	2,901.3	1,137.4
Tennessee					
Logging and sawmills[1]	525	7.3	80.3	353.7	138.4
Plywood, veneer, and wood products[2]	311	6.7	74.9	346.1	127.7
Wood furniture and fixtures[3]	215	14.8	152.8	615.3	315.8
Pulp, paper, and board mills[4]	14	4.9	137.9	992.7	479.1
Paper and paperboard products[5]	126	12.2	201.8	1,285.4	575.6
Total, all forest industries	1,191	46.0	647.7	3,593.1	1,636.5
Arkansas					
Logging and sawmills[1]	711	10.0	124.4	753.6	246.1
Plywood, veneer, and wood products[2]	189	6.9	88.5	495.1	154.0
Wood furniture and fixtures[3]	47	4.3	46.6	185.9	86.2
Pulp, paper, and board mills[4]	7	5.2	156.5	1,048.8	425.7
Paper and paperboard products[5]	69	6.0	104.4	950.2	370.9
Total, all forest industries	1,023	32.4	520.4	3,433.7	1,282.9
Louisiana					
Logging and sawmills[1]	591	5.5	68.7	449.0	153.0
Plywood, veneer, and wood products[2]	178	5.6	77.0	411.3	124.9
Wood furniture and fixtures[3]	4	0.3	3.3	15.9	7.7
Pulp, paper, and board mills[4]	14	7.4	217.5	1,541.8	573.4
Paper and paperboard products[5]	43	3.6	67.5	434.7	132.4
Total, all forest industries	830	22.3	433.9	2,852.8	991.4
Texas					
Logging and sawmills[1]	449	5.4	70.3	502.9	175.8
Plywood, veneer, and wood products[2]	783	28.0	390.1	2,070.0	729.1
Wood furniture and fixtures[3]	253	6.2	77.3	267.2	145.5
Pulp, paper, and board mills[4]	10	6.0	164.7	1,092.7	367.9
Paper and paperboard products[5]	248	14.9	255.6	1,538.9	628.2
Total, all forest industries	1,743	60.5	958.1	5,471.7	2,046.5

Table 1.9—Number of establishments, employment, wages and salaries, value of shipments, and value added by manufacture in the forest industries in the South, by region, State, and type of industry, 1982—Continued

Region, State, and type of forest industry	Establishments	Employment	Wages and salaries	Value of shipments	Value added by manufacture
	Number	*Thousand employees*	*Million dollars*	*Million dollars*	*Million dollars*
Oklahoma					
Logging and sawmills[1]	68	1.2	17.2	172.0	37.6
Plywood, veneer, and wood products[2]	125	2.4	33.9	162.3	61.2
Wood furniture and fixtures[3]	46	1.6	21.8	87.1	42.7
Pulp, paper, and board mills[4]	5	1.0	30.1	240.9	79.6
Paper and paperboard products[5]	37	1.6	28.8	272.0	96.1
Total, all forest industries	281	7.8	131.8	934.3	317.2
Total, South Central Region					
Logging and sawmills[1]	4,376	51.2	611.5	3,704.8	1,241.7
Plywood, veneer, and wood products[2]	2,094	69.7	939.0	4,988.5	1,744.2
Wood furniture and fixtures[3]	797	43.3	485.0	2,027.7	1,004.7
Pulp, paper, and board mills[4]	75	43.2	1,223.6	8,111.5	3,387.5
Paper and paperboard products[5]	630	45.5	789.7	5,657.9	2,392.1
Total, all forest industries	7,972	253.1	4,048.8	24,490.4	9,770.1
Southwide total					
Logging and sawmills[1]	9,151	99.7	1,162.9	7,093.2	2,316.3
Plywood, veneer, and wood products[2]	4,351	133.4	1,777.9	9,584.2	3,400.4
Wood furniture and fixtures[3]	1,955	145.9	1,628.5	6,257.7	3,216.0
Pulp, paper, and board mills[4]	144	82.7	2,282.9	14,659.3	6,047.5
Paper and paperboard products[5]	1,274	95.0	1,658.5	11,601.8	4,735.9
Total, all forest industries	16,875	556.8	8,510.9	49,196.0	19,715.8

[1] Establishments or contractors primarily engaged in cutting timber and manufacturers whose primary products include rough and dressed lumber, flooring, dimension stock, railroad ties, furniture frames, wood lath and wood chips (industries included under Standard Industrial Classification (SIC) codes 241 and 242).

[2] Manufacturers whose primary products include veneer, plywood, millwork, wood containers, pallets, prefabricated wood structures, mobile homes, shingles, excelsior, particleboard, and gums and wood chemicals, plus the wood preserving industry (SIC codes 243, 244, 245, 249, and 2861).

[3] Manufacturers whose primary products include wood household or office furniture or wood partitions and fixtures (SIC codes 2511, 2512, 2517, 2521, 2541).

[4] Manufacturers whose primary products include pulp, paper, paperboard, and building paper and board (SIC codes 261, 262, 263, 266).

[5] Manufacturers whose primary products include converted paper and paperboard products such as stationery, sanitary paper products, and containers and boxes (SIC codes 264 and 265).

Note: Data may not add to totals because of rounding.

Source: Derived from data published by the U.S. Department of Commerce, Bureau of the Census, Census of Manufactures 1982. For categories where the Bureau of the Census withheld data to avoid disclosure of information about particular companies, estimates were made based on approximate employment figures, industry averages, and information available on closely related industries.

Table 1.10—Employment in manufacturing of lumber and wood products[1] and pulp and paper products[2] in the South, by region and State, selected years 1947–82

Thousand employees

Region and State	1982	1977	1972	1967	1963	1958	1954	1947
Southeast								
Virginia								
Lumber and wood products	19.2	21.2	20.7	19.2	20.9	22.3	22.8	23.3
Pulp and paper products	13.6	13.1	13.5	13.2	12.1	10.9	10.9	10.7
North Carolina								
Lumber and wood products	29.4	30.0	28.7	25.0	27.4	31.3	32.1	31.1
Pulp and paper products	20.3	19.4	16.5	15.5	13.2	10.9	9.7	7.9
South Carolina								
Lumber and wood products	13.0	13.5	13.4	13.0	14.8	16.6	18.1	21.7
Pulp and paper products	11.8	12.5	12.3	10.0	8.8	7.1	6.2	5.8
Georgia								
Lumber and wood products	22.3	21.5	21.6	19.4	22.7	26.5	32.3	34.0
Pulp and paper products	28.0	26.2	24.2	22.8	20.5	16.8	13.8	7.3
Florida								
Lumber and wood products	15.6	13.6	15.8	12.1	12.0	13.5	16.0	15.7
Pulp and paper products	15.3	15.3	15.8	16.3	13.6	13.2	11.6	5.7
Total								
Lumber and wood products	99.5	99.8	100.2	88.7	97.8	110.2	121.3	125.8
Pulp and paper products	89.0	86.5	82.3	77.8	68.2	58.9	52.2	37.4
South Central								
Alabama								
Lumber and wood products	19.2	21.1	21.0	19.6	19.9	23.8	28.4	37.4
Pulp and paper products	18.8	18.8	17.4	15.0	11.7	9.8	8.7	5.7
Mississippi								
Lumber and wood products	18.4	21.4	21.8	20.3	20.9	19.6	21.3	28.6
Pulp and paper products	7.1	5.9	6.6	5.6	4.8	8.1	8.1	4.8
Tennessee								
Lumber and wood products	12.6	15.3	15.3	15.5	16.6	17.5	18.0	19.1
Pulp and paper products	17.1	16.5	16.3	12.4	10.2	9.1	7.9	4.8
Arkansas								
Lumber and wood products	16.2	18.3	20.3	19.7	21.2	21.3	21.8	28.2
Pulp and paper products	11.2	10.2	9.4	7.4	7.2	5.2	4.0	3.2
Louisiana								
Lumber and wood products	10.0	13.9	14.1	13.9	14.7	17.1	19.5	29.1
Pulp and paper products	11.0	15.0	15.5	14.5	15.6	16.9	17.1	14.2
Texas								
Lumber and wood products	26.6	27.2	24.8	19.1	17.3	17.2	20.7	30.7
Pulp and paper products	20.9	19.8	17.6	14.6	11.6	9.7	8.1	4.7
Oklahoma								
Lumber and wood products	3.2	3.2	2.9	1.8	2.0	2.1	1.9	2.3
Pulp and paper products	2.6	1.8	1.8	1.0	0.8	0.6	0.6	0.4
Total								
Lumber and wood products	106.2	120.4	120.2	109.9	112.6	118.6	131.6	175.4
Pulp and paper products	88.7	88.0	84.6	70.5	61.9	59.4	54.5	37.8
Southwide total								
Lumber and wood products	205.7	220.2	220.4	198.6	210.4	228.8	252.9	301.2
Pulp and paper products	177.7	174.5	166.9	148.3	130.1	118.3	106.7	75.2

Table 1.10—Employment in manufacturing of lumber and wood products[1] and pulp and paper products[2] in the South, by region and State, selected years 1947–82—Continued

[1] Manufacturing industries included under Standard Industrial Classification (SIC) code 24 in the Census of Manufactures for each year, with the following exceptions. Data for SIC 2411, logging camps and logging contractors, were not collected by the 1947 census. This category represented about 11 percent of employment under SIC 24 in the 1954 census. Data for SIC 2451, mobile homes, were included under SIC 24 for the first time in the 1972 census. To improve comparability with earlier census years, data for SIC 2451 are not included in the figures for census years 1972, 1977, and 1982. SIC 24 does not include wooden furniture and fixtures.

[2] Manufacturing industries included under SIC code 26 in the Census of Manufactures for each year, such as pulp, paper, and paperboard mills, paperboard containers and boxes, and converted paper products.

Source: U.S.Department of Commerce, Bureau of the Census, Censuses of Manufactures.

Table 1.11—Wages and salaries in manufacturing of lumber and wood products[1] and pulp and paper products[2] in the South, by region and State, selected years 1947–82. Data are shown in current dollars and constant 1967 dollars.

Million dollars

Region and State	1982	1977	1972	1967	1963	1958	1954	1947
Southeast								
Virginia								
Lumber and wood products	227.9	182.3	120.7	73.6	60.5	49.5	45.5	34.8
Pulp and paper products	298.3	187.7	127.8	89.8	70.0	53.8	42.1	26.1
North Carolina								
Lumber and wood products	344.9	252.8	165.4	95.6	76.9	65.7	62.3	47.2
Pulp and paper products	423.6	267.0	150.2	103.2	75.8	52.2	38.9	23.4
South Carolina								
Lumber and wood products	160.6	122.7	73.8	46.6	40.4	34.3	32.6	29.9
Pulp and paper products	257.7	180.2	120.4	72.0	52.7	35.1	25.5	15.8
Georgia								
Lumber and wood products	268.8	190.6	120.8	71.8	62.2	57.0	60.5	44.6
Pulp and paper products	62.7	378.5	232.9	157.4	119.3	80.5	55.3	19.2
Florida								
Lumber and wood products	191.3	121.0	96.4	51.6	40.1	35.7	36.0	25.8
Pulp and paper products	325.8	227.5	152.9	115.3	83.0	64.2	47.5	15.5
Total								
Lumber and wood products	1,193.5	869.4	577.1	339.2	280.1	242.2	236.9	182.3
Pulp and paper products	1,928.1	1,240.9	784.2	537.7	400.8	285.8	209.3	100.0
South Central								
Alabama								
Lumber and wood products	229.1	183.0	116.4	73.8	55.0	50.1	52.0	49.5
Pulp and paper products	487.7	299.2	170.7	113.6	76.4	51.5	35.0	14.5
Mississippi								
Lumber and wood products	232.9	193.5	130.3	87.2	72.7	44.7	42.4	42.5
Pulp and paper products	160.8	85.8	62.0	37.9	29.3	39.7	32.2	13.0
Tennessee								
Lumber and wood products	139.4	120.3	85.5	59.9	49.2	42.4	41.0	31.2
Pulp and paper products	339.7	211.8	142.1	83.8	59.2	43.7	31.7	11.8
Arkansas								
Lumber and wood products	205.1	171.3	120.0	80.0	66.6	51.8	48.1	47.3
Pulp and paper products	260.9	151.5	88.9	50.8	40.4	27.0	15.9	8.1
Louisiana								
Lumber and wood products	133.3	131.7	86.3	58.8	46.2	44.4	43.4	47.3
Pulp and paper products	285.0	245.8	161.9	110.1	92.4	85.2	70.2	37.9
Texas								
Lumber and wood products	359.3	248.9	147.6	79.1	59.4	47.4	48.1	51.4
Pulp and paper products	420.3	272.0	154.1	96.3	68.3	50.9	33.8	13.1
Oklahoma								
Lumber and wood products	45.4	33.1	18.1	8.1	7.0	5.9	5.1	4.6
Pulp and paper products	58.9	26.0	16.5	6.5	4.9	3.3	2.4	.9
Total								
Lumber and wood products	1,344.5	1,081.8	704.2	446.9	356.1	286.7	280.1	273.8
Pulp and paper products	2,013.3	1,292.1	796.2	499.0	370.9	301.3	221.2	99.3
Southwide, total								
Lumber and wood products	2,538.0	1,951.2	1,281.3	786.1	636.2	528.9	517.0	456.1
Pulp and paper products	3,941.4	2,533.0	1,580.4	1,036.7	771.7	587.1	430.5	199.3

Table 1.11—Wages and salaries in manufacturing of lumber and wood products[1] and pulp and paper products[2] in the South, by region and State, selected years 1947–82. Data are shown in current dollars and constant 1967 dollars.—Continued

Million 1967 dollars[3]

Region and State	1982	1977	1972	1967	1963	1958	1954	1947
Southeast								
Virginia								
Lumber and wood products	78.8	100.4	120.7	73.6	66.0	57.2	56.5	52.0
Pulp and paper products	103.2	103.4	127.8	89.8	76.3	62.1	52.3	39.0
North Carolina								
Lumber and wood products	119.3	139.3	165.4	95.6	83.9	75.9	77.4	70.6
Pulp and paper products	146.5	147.1	150.2	103.2	82.7	60.3	48.3	35.0
South Carolina								
Lumber and wood products	55.6	67.6	73.8	46.6	44.1	39.6	40.5	44.7
Pulp and paper products	89.1	99.3	120.4	72.0	57.5	40.5	31.7	23.6
Georgia								
Lumber and wood products	93.0	105.0	120.8	71.8	67.8	65.8	75.2	66.7
Pulp and paper products	215.4	208.5	232.9	157.4	130.1	93.0	68.7	28.7
Florida								
Lumber and wood products	66.2	66.7	96.4	51.6	43.7	41.2	44.7	38.6
Pulp and paper products	112.7	125.3	152.9	115.3	90.5	74.1	59.0	23.2
Total								
Lumber and wood products	412.8	479.0	460.6	339.2	305.5	279.7	294.3	272.5
Pulp and paper products	666.9	683.7	625.9	537.7	437.1	330.0	260.0	149.5
South Central								
Alabama								
Lumber and wood products	79.2	100.8	92.9	73.8	60.0	57.9	64.6	74.0
Pulp and paper products	168.7	164.8	136.2	113.6	83.3	59.5	43.5	21.7
Mississippi								
Lumber and wood products	80.6	106.6	104.0	87.2	79.3	51.6	52.7	63.5
Pulp and paper products	55.6	47.3	49.5	37.9	32.0	45.8	40.0	19.4
Tennessee								
Lumber and wood products	48.2	66.3	68.2	59.9	53.7	49.0	50.9	46.6
Pulp and paper products	117.5	116.7	113.4	83.8	64.6	50.5	39.4	17.6
Arkansas								
Lumber and wood products	70.9	94.4	95.8	80.0	72.6	59.8	59.8	70.7
Pulp and paper products	90.2	83.5	70.9	50.8	44.1	31.2	19.8	12.1
Louisiana								
Lumber and wood products	46.1	72.6	68.9	58.8	50.4	51.3	53.9	70.7
Pulp and paper products	98.6	135.4	129.2	110.1	100.8	98.4	87.2	56.7
Texas								
Lumber and wood products	124.3	137.1	117.8	79.1	64.8	54.7	59.8	76.8
Pulp and paper products	145.4	149.9	123.0	96.3	74.5	58.8	42.0	19.6
Oklahoma								
Lumber and wood products	15.7	18.2	14.4	8.1	7.6	6.8	6.3	6.9
Pulp and paper products	20.4	14.3	13.2	6.5	5.3	3.8	3.0	1.3
Total								
Lumber and wood products	465.1	596.0	562.0	446.9	388.3	331.1	348.0	409.3
Pulp and paper products	696.4	711.9	635.4	499.0	404.5	347.9	274.8	148.4
Southwide total								
Lumber and wood products	877.9	1,075.0	1,022.6	786.1	693.8	610.7	642.2	681.8
Pulp and paper products	1,363.3	1,395.6	1,261.3	1,036.7	841.5	677.9	534.8	297.9

Table 1.11—Wages and salaries in manufacturing of lumber and wood products[1] and pulp and paper products[2] in the South, by region and State, selected years 1947–82. Data are shown in current dollars and constant 1967 dollars.—Continued

[1] Manufacturing industries included under Standard Industrial Classification (SIC) code 24 in the Census of Manufactures for each year, with the following exceptions. Data for SIC 2411, logging camps and logging contractors, were not collected by the 1947 census. This category represented about 11 percent of employment under SIC 24 in the 1954 census. Data for SIC 2451, mobile homes, were included under SIC 24 for the first time in the 1972 census. To improve comparability with earlier census years, data for SIC 2451 are not included in the figures for census years 1972, 1977, and 1982. SIC 24 does not include wooden furniture and fixtures.

[2] Manufacturing industries included under SIC code 26 in the Census of Manufactures for each year, such as pulp, paper, and paperboard mills, paperboard containers and boxes, and converted paper products.

[3] Converted to constant dollars by dividing current dollars by the Consumer Price Index for all items as reported by the U.S. Department of Commerce, Bureau of Economic Analysis, 1967 = 100.

Source: U.S. Department of Commerce, Bureau of the Census, Censuses of Manufactures.

Table 1.12—Value added in manufacturing of lumber and wood products[1] and pulp and paper products[2] in the South, by region and State, selected years 1947–82. Data are shown in current dollars and constant 1967 dollars.

Million dollars

Region and State	1982[3]	1977	1972	1967	1963	1958	1954	1947
Southeast								
Virginia								
Lumber and wood products	432.5	405.7	264.6	141.4	105.1	77.2	72.6	63.4
Pulp and paper products	854.0	546.2	301.7	230.7	171.7	131.0	102.1	71.9
North Carolina								
Lumber and wood products	673.0	539.3	328.8	167.6	129.1	101.7	100.1	84.1
Pulp and paper products	1,050.9	715.7	319.5	227.8	176.5	102.7	91.4	47.4
South Carolina								
Lumber and wood products	311.1	288.5	160.7	87.4	71.0	51.9	51.7	59.4
Pulp and paper products	699.9	463.5	292.6	193.2	140.1	83.4	68.7	36.9
Georgia								
Lumber and wood products	565.2	492.4	274.2	136.9	111.0	94.9	101.5	88.5
Pulp and paper products	1,724.2	950.4	600.9	443.0	339.3	228.4	155.1	54.2
Florida								
Lumber and wood products	339.4	258.0	193.7	94.8	68.5	56.3	56.9	47.2
Pulp and paper products	674.8	541.0	351.7	290.9	204.6	151.5	139.2	55.8
Total								
Lumber and wood products	2,321.2	1,983.9	1,222.0	628.1	484.7	382.0	382.8	342.6
Pulp and paper products	5,003.8	3,216.8	1,866.4	1,385.6	1,032.2	697.0	556.5	266.2
South Central								
Alabama								
Lumber and wood products	458.6	429.0	255.6	142.8	100.9	77.9	86.6	101.1
Pulp and paper products	1,704.9	966.3	468.8	323.2	165.6	112.3	77.1	39.9
Mississippi								
Lumber and wood products	469.3	501.7	278.7	165.8	130.7	65.3	71.2	87.6
Pulp and paper products	345.8	270.6	169.1	74.0	57.8	82.5	85.7	36.5
Tennessee								
Lumber and wood products	236.4	240.5	182.8	105.4	85.6	65.3	71.0	51.9
Pulp and paper products	1,054.7	618.4	360.9	218.1	152.1	110.4	64.5	35.8
Arkansas								
Lumber and wood products	388.4	422.3	257.6	140.5	119.8	78.6	71.5	81.4
Pulp and paper products	796.6	409.7	244.9	150.2	118.9	65.6	48.7	21.9
Louisiana								
Lumber and wood products	251.7	315.0	202.0	105.0	74.7	67.8	68.3	84.1
Pulp and paper products	705.8	692.9	396.9	254.0	202.6	185.6	163.2	99.2
Texas								
Lumber and wood products	696.1	600.4	296.7	145.8	108.8	78.6	76.4	96.0
Pulp and paper products	996.1	663.0	342.0	215.8	150.0	113.7	68.2	33.0
Oklahoma								
Lumber and wood products	90.1	71.8	53.2	12.3	12.5	8.6	7.8	8.1
Pulp and paper products	175.7	84.1	45.6	18.7	13.4	9.1	6.1	2.0
Total								
Lumber and wood products	2,590.6	2,580.7	1,526.6	817.6	633.0	442.1	452.8	510.2
Pulp and paper products	5,779.6	3,705.0	2,028.2	1,254.0	860.4	679.2	513.5	268.3
Southwide total								
Lumber and wood products	4,911.8	4,564.6	2,748.6	1,445.7	1,117.7	824.1	835.6	852.8
Pulp and paper products	10,783.4	6,921.8	3,894.6	2,639.6	1,892.6	1,376.2	1,070.0	534.5

Table 1.12—Value added in manufacturing of lumber and wood products[1] and pulp and paper products[2] in the South, by region and State, selected years 1947–82. Data are shown in current dollars and constant 1967 dollars.—Continued

Million 1967 dollars[4]

Region and State	1982[3]	1977	1972	1967	1963	1958	1954	1947
Southeast								
Virginia								
Lumber and wood products	138.5	207.9	224.4	141.4	111.0	82.5	85.4	89.5
Pulp and paper products	273.5	280.0	255.9	230.7	181.3	140.0	120.1	101.6
North Carolina								
Lumber and wood products	215.5	276.4	278.9	167.6	136.3	108.7	117.8	118.8
Pulp and paper products	336.5	366.8	271.0	227.8	186.4	109.7	107.5	66.9
South Carolina								
Lumber and wood products	99.6	147.9	136.3	87.4	75.0	55.4	60.8	83.9
Pulp and paper products	224.1	237.6	248.2	193.2	147.9	89.1	80.8	52.1
Georgia								
Lumber and wood products	181.0	252.4	232.6	136.9	117.2	101.4	119.4	125.0
Pulp and paper products	552.1	487.1	509.7	443.0	358.3	244.0	182.5	76.6
Florida								
Lumber and wood products	108.7	132.2	164.3	94.8	72.3	60.1	66.9	66.7
Pulp and paper products	216.1	277.3	298.3	290.9	216.1	161.9	163.8	78.8
Total								
Lumber and wood products	743.3	1,016.9	1,036.5	628.1	511.8	408.1	450.4	483.9
Pulp and paper products	1,602.2	1,648.8	1,583.0	1,385.6	1,090.0	744.7	654.7	376.0
South Central								
Alabama								
Lumber and wood products	146.8	219.9	216.8	142.8	106.5	83.2	101.9	142.8
Pulp and paper products	545.9	495.3	397.6	323.2	174.9	120.0	90.7	56.4
Mississippi								
Lumber and wood products	150.3	257.2	236.4	165.8	138.0	69.8	83.8	123.7
Pulp and paper products	110.7	138.7	143.4	74.0	61.0	88.1	100.8	51.6
Tennessee								
Lumber and wood products	75.7	123.3	155.0	105.4	90.4	69.8	83.5	73.3
Pulp and paper products	337.7	317.0	306.1	218.1	160.6	117.9	75.9	50.6
Arkansas								
Lumber and wood products	124.4	216.5	218.5	140.5	126.5	84.0	84.1	115.0
Pulp and paper products	255.1	210.0	207.7	150.2	125.6	70.1	57.3	30.9
Louisiana								
Lumber and wood products	80.6	161.5	171.3	105.0	78.9	72.4	80.4	118.8
Pulp and paper products	226.0	355.2	336.6	254.0	213.9	198.3	192.0	140.1
Texas								
Lumber and wood products	222.9	307.7	251.7	145.8	114.9	84.0	89.9	135.6
Pulp and paper products	319.0	339.8	290.1	215.8	158.4	121.5	80.2	46.6
Oklahoma								
Lumber and wood products	28.9	36.8	45.1	12.3	13.2	9.2	9.2	11.4
Pulp and paper products	56.3	43.1	38.7	18.7	14.1	9.7	7.2	2.8
Total								
Lumber and wood products	829.5	1,322.8	1,294.8	817.6	668.4	472.3	532.7	720.6
Pulp and paper products	1,850.7	1,899.0	1,720.3	1,254.0	908.6	725.6	604.1	379.0
Southwide total								
Lumber and wood products	1,572.8	2,339.6	2,331.3	1,445.7	1,180.3	880.4	983.1	1,204.5
Pulp and paper products	3,452.9	3,547.8	3,303.3	2,639.6	1,998.5	1,470.3	1,258.8	754.9

Table 1.12—Value added in manufacturing of lumber and wood products[1] and pulp and paper products[2] in the South, by region and State, selected years 1947–82. Data are shown in current dollars and constant 1967 dollars.—Continued

[1] Manufacturing industries included under Standard Industrial Classification (SIC) code 24 in the Census of Manufactures for each year, with the following exceptions. Data for SIC 2411, logging camps and logging contractors, were not collected by the 1947 census. This category represented about 11 percent of employment under SIC 24 in the 1954 census. Data for SIC 2451, mobile homes, were included under SIC 24 for the first time in the 1972 census. To improve comparability with earlier census years, data for SIC 2451 are not included in the figures for census years 1972, 1977, and 1982. SIC 24 does not include wooden furniture and fixtures.

[2] Manufacturing industries included under SIC code 26 in the Census of Manufactures for each year, such as pulp, paper, and paperboard mills, paperboard containers and boxes, and converted paper products.

[3] Due to a change in instructions for reporting inventory values for the 1982 Economic Censuses, value added figures for 1982 may not be strictly comparable to figures for prior years.

[4] Converted to constant dollars by dividing current dollars by the Producer Price Index for all industrial commodities as reported by the Department of Commerce, Bureau of Economic Analysis, 1967 = 100.

Source: U.S. Department of Commerce, Bureau of the Census, Censuses of Manufactures.

Table 1.13—Employment, wages and salaries, and value added by manufacture in forest industries in the South, by industry group, region and State, 1982 and 1985[1]

	Lumber and wood products[2]								
	Employment			Wages and salaries			Value added		
	1982	1985	Change[3]	1982	1985	Change[3]	1982	1985	Change[3]
	Thousand employees	*Thousand employees*	*Percent*	*Million 1985 dollars*	*Million 1985 dollars*	*Percent*	*Million 1985 dollars*	*Million 1985 dollars*	*Percent*
Southeast									
Virginia	19.6	21.4	9.2	261.0	292.8	12.2	462.8	685.4	48.1
North Carolina	32.0	34.7	8.4	425.5	474.6	11.5	765.8	959.9	25.3
South Carolina	13.0	14.9	14.6	178.9	207.5	16.0	322.6	435.6	35.0
Georgia	26.3	27.6	4.9	358.0	418.5	16.9	706.0	733.6	3.9
Florida	19.0	21.1	11.1	273.3	316.6	15.8	450.9	611.7	35.7
Total	109.9	119.7	8.9	1,496.8	1,710.0	14.2	2,708.1	3,426.2	26.5
South Central									
Alabama	22.6	23.0	1.8	307.9	332.5	8.0	553.2	727.6	31.5
Mississippi	19.3	20.8	7.8	273.0	310.9	13.9	513.3	580.6	13.1
Tennessee	14.1	14.9	5.7	172.9	196.4	13.6	275.8	385.6	39.8
Arkansas	16.9	16.0	−5.3	237.2	242.1	2.1	414.9	471.6	13.7
Louisiana	10.8	10.4	−3.7	158.1	171.7	8.6	278.2	364.9	31.1
Texas	33.4	33.3	−0.3	513.0	511.7	−0.3	938.2	1,138.4	21.3
Oklahoma	3.6	2.5	−30.6	56.9	40.9	−28.1	102.5	76.5	−25.4
Total	120.7	120.9	0.2	1,719.0	1,806.2	5.1	3,076.2	3,745.2	21.7
Southwide total	230.6	240.6	4.3	3,215.8	3,516.2	9.3	5,784.3	7,171.4	24.0

Table 1.13—Employment, wages and salaries, and value added by manufacture in forest industries in the South, by industry group, region and State, 1982 and 1985[1]—Continued

	Pulp and paper products[4]								
	Employment			Wages and salaries			Value added		
	1982	1985	Change[3]	1982	1985	Change[3]	1982	1985	Change[3]
	Thousand employees	*Thousand employees*	*Percent*	*Million 1985 dollars*	*Million 1985 dollars*	*Percent*	*Million 1985 dollars*	*Million 1985 dollars*	*Percent*
Southeast									
Virginia	13.6	14.3	5.1	332.3	378.3	13.8	885.6	1,045.3	18.0
North Carolina	20.3	20.0	−1.5	471.9	505.2	7.1	1,089.8	1,106.2	1.5
South Carolina	11.8	13.1	11.0	287.1	358.3	24.8	725.8	1,018.1	40.3
Georgia	28.0	28.7	2.5	693.7	761.3	9.7	1,788.0	2,009.8	12.4
Florida	15.3	13.6	−11.1	362.9	369.9	1.9	699.8	767.6	9.7
Total	89.0	89.7	.8	2,147.9	2,373.0	10.5	5,188.9	5,947.0	14.6
South Central									
Alabama	18.8	19.6	4.3	543.3	597.1	9.9	1,768.0	1,879.4	6.3
Mississippi	7.1	7.9	11.3	179.1	212.3	18.5	358.6	530.6	48.0
Tennessee	17.1	16.5	−3.5	378.4	392.9	3.8	1,093.7	1,251.6	14.4
Arkansas	11.2	10.8	−3.6	290.6	297.0	2.2	826.1	629.4	−23.8
Louisiana	11.0	10.2	−7.3	317.5	320.1	0.8	731.9	873.1	19.3
Texas	20.9	21.8	4.3	468.2	492.1	5.1	1,033.0	1,173.7	13.6
Oklahoma	2.6	3.4	30.8	65.6	88.1	34.3	182.2	272.6	49.6
Total	88.7	90.2	1.7	2,242.8	2,399.6	7.0	5,993.4	6,610.4	10.3
Southwide total	177.7	179.9	1.2	4,390.7	4,772.6	8.7	11,182.4	12,557.4	12.3

[1] Figures for 1982 are compiled from the census of all manufacturing establishments in that year. The 1982 data were converted to 1985 dollars by dividing dollars of wages and salaries by the Consumer Price Index for all items and dollars of value added by the Producer Price Index for all commodities as reported by the Department of Commerce, Bureau of Economic Analysis, 1985 = 100. Figures for 1985 are estimated from a sample of manufacturing establishments reported in U.S. Department of Commerce, Bureau of the Census, 1985 Annual Survey of Manufactures, Geographic Area Statistics M85(AS)-5.

[2] All industries included under Standard Industrial Classification code 24.

[3] Change between 1982 and 1985 figures as a percentage of the 1982 figure.

[4] All industries included under Standard Industrial Classification code 26.

[This page intentionally left blank.]

Appendix 2

Table 2.1—Rosin production in the United States, by source, selected years 1900–84

Year[1]	Total production	Gum: Production	Gum: Proportion[2]	Steam-distilled wood: Production	Steam-distilled wood: Proportion[2]	Tall oil: Production	Tall oil: Proportion[2]
	Thousand drums	*Thousand 517-pound drums*	*Percent*	*Thousand 520-pound drums*	*Percent*	*Thousand 520-pound drums*	*Percent*
1900	1,652	1,652	100	—	—	—	—
1905	1,571	1;571	100	—	—	—	—
1910	1,649	1,638	99	11	1	—	—
1915	1,443	1,412	98	31	2	—	—
1920	1,358	1,287	95	71	5	—	—
1925	1,516	1,288	85	228	15	—	—
1930	1,972	1,621	82	351	18	—	—
1935	1,821	1,361	75	460	25	—	—
1940	1,717	939	55	778	45	—	—
1945	1,452	694	48	758	52	—	—
1950	2,172	798	37	1,339	62	35	2
1955	1,947	453	23	1,369	70	125	6
1960	2,010	370	18	1,220	61	420	21
1965	2,067	361	17	1,080	52	626	30
1970	1,656	88	5	768	46	800	48
1975	1,088	72	7	358	33	658	60
1980	1,325	23	2	440	33	859	65
1982	1,104	17	2	338	31	746	68
1983	1,169	17	1	338	29	814	70
1984	1,138	16	2	254	22	868	76

[1] Crop year April–March 1900–75, calendar year 1980–84.

[2] Production from the given source as a percentage of total production.

Note: Data may not add to totals because of rounding.

Sources: *1900–61*—King, D.B.; Wagner, H.B.; Goldsborough, G.H. 1962. The outlook for naval stores. Washington, DC: U.S. Department of Agriculture, Forest Service, Agricultural Stabilization and Conservation Service, and Statistical Reporting Service: 63. *1955–74*—U.S. Department of Agriculture, Crop Reporting Board, Statistical Reporting Service. 1977. Naval stores a summary of annual and monthly statistics, 1954–74. Stat. Bull. 567. Washington, DC: U.S. Department of Agriculture: 5. *1968–79*—Ulrich, A.H. 1983. Timber production, trade, consumption, and price statistics 1950–81. Misc. Publ. 1424. Washington, DC: U.S. Department of Agriculture, Forest Service: 76. *1980–84*—[Derived from] Naval Stores Review. 1984. Naval stores review international yearbook. New Orleans: Naval Stores Review: 5.

Table 2.2—Turpentine production in the United States, by type, selected years 1900–84

Year[2]	Total production	Gum: Production	Gum: Proportion[3]	Steam-distilled wood[1]: Production	Steam-distilled wood[1]: Proportion[3]	Sulfate: Production	Sulfate: Proportion[3]
	Thousand 50-gallon barrels	*Thousand 50-gallon barrels*	*Percent*	*Thousand 50-gallon barrels*	*Percent*	*Thousand 50-gallon barrels*	*Percent*
1900	620	620	100	—	—	—	—
1905	590	590	100	—	—	—	—
1910	617	615	100	2	(4)	—	—
1915	537	530	99	7	1	—	—
1920	510	489	96	21	4	—	—
1925	545	478	88	67	12	—	—
1930	685	599	87	82	12	4	1
1935	603	497	82	94	16	12	2
1940	566	344	61	168	30	54	10
1945	488	244	50	134	27	110	23
1950	709	272	38	243	34	194	27
1955	656	149	23	204	31	303	46
1960	605	119	20	163	27	323	53
1965	701	111	16	169	24	421	60
1970	576	26	5	95	16	455	79
1975	448	21	5	41	9	385	86
1980	554	6	1	48	9	500	90
1982	468	5	1	37	8	426	91
1983	484	5	1	36	7	444	92
1984	465	4	1	28	6	433	93

[1] Data for 1919–56 include small amounts of destructively distilled turpentine.

[2] Crop year April–March 1900–75, calendar year 1980–84.

[3] Production from the given source as a percentage of total production.

[4] Less than 1 percent.

Sources: See footnote on appendix table 2.1.

Table 2.3—Reported lumber production in the South, by major species or species group, selected years 1869–1984

Million board feet, lumber tally

Year	All species	Softwoods: Total	Softwoods: Southern yellow pine	Softwoods: Cypress	Softwoods: Other softwoods	Hardwoods: Total	Hardwoods: Oak–hickory	Hardwoods: Gum and tupelo	Hardwoods: Elm–ash–cottonwood	Hardwoods: Other hardwoods
1869	1,493	1,136	1,083	26	327	357	219	([1])	([1])	138
1879	2,804	2,174	2,034	105	35	630	376	10	([1])	244
1889	5,579	4,277	4,005	226	46	1,302	758	34	([1])	510
1899	12,067	9,816	9,314	483	19	2,251	1,185	163	384	519
1904	14,153	11,900	11,132	723	45	2,253	1,114	309	338	492
1905	11,041	9,312	8,481	735	96	1,729	752	237	275	465
1910	18,449	15,231	13,830	905	496	3,218	1,728	575	271	644
1915	15,368	13,199	12,055	899	246	2,169	1,006	558	209	396
1920	12,046	9,551	8,877	526	148	2,495	1,093	796	175	431
1925	17,791	14,163	13,165	846	152	3,628	1,481	1,288	263	596
1930	10,572	7,940	7,402	483	55	2,632	1,090	928	198	416
1935	8,166	6,259	5,910	318	31	1,907	791	622	142	312
1940	12,961	10,590	10,094	401	95	2,371	973	692	153	553
1945	11,504	7,392	7,027	226	139	4,112	1,780	1,367	168	797
1950[2]	13,885	9,904	9,481	([1])	([1])	3,982	1,915	1,029	[3]117	921
1954	11,743	7,670	7,045	([1])	([1])	4,073	([1])	([1])	([1])	([1])
1955	12,154	7,689	7,056	([1])	([1])	4,463	([1])	([1])	([1])	([1])
1960	9,299	5,870	5,474	([1])	([1])	3,429	([1])	([1])	([1])	([1])
1965	10,770	6,778	6,398	([1])	([1])	3,992	([1])	([1])	([1])	([1])
1970	10,812	7,186	([1])	([1])	([1])	3,626	([1])	([1])	([1])	([1])
1975	9,739	7,016	([1])	([1])	([1])	2,723	([1])	([1])	([1])	([1])
1980	10,268	6,937	([1])	([1])	([1])	3,331	([1])	([1])	([1])	([1])
1981	9,306	7,040	([1])	([1])	([1])	2,266	([1])	([1])	([1])	([1])
1982	10,779	8,789	([1])	([1])	([1])	1,990	([1])	([1])	([1])	([1])
1983	12,695	10,290	([1])	([1])	([1])	2,405	([1])	([1])	([1])	([1])
1984	13,417	10,702	([1])	([1])	([1])	2,715	([1])	([1])	([1])	([1])

[1] Data not available.

[2] Excludes Tennessee.

[3] Excludes elm.

Note: Data may not add to totals because of rounding.

Sources: *1869–1945*—Steer, Henry B. 1948. Lumber production in the United States 1799–1946. Misc. Publ. 669. Washington, DC: U.S. Department of Agriculture. 233 p. 1950–84 U.S. Department of Commerce, Bureau of the Census. [Annual issues.] Current industrial reports series: lumber production and mill stocks MA24T [M13G before 1955]. Washington, DC: U. S. Department of Commerce, Bureau of the Census. (Southern yellow pine entries for 1954–65 are from Southern Forest Resource Analysis Committee. 1969. The South's third forest . . . how it can meet future demands. [Place of publication unknown]: Southern Forest Resource Analysis Committee. 111 p.)

Table 2.4—Reported lumber production in the South, by region, State, and species group, selected years 1955–84

Million board feet, lumber tally

	Southeast																	
	Total			Florida			Georgia			North Carolina			South Carolina			Virginia		
Year	All species	Softwood	Hardwood	All species	Softwood	Hardwood	All species	Softwood	Hardwood	All species	Softwood	Hardwood	All species	Softwood	Hardwood	All species	Softwood	Hardwood
1955	6,030	4,389	1,641	421	366	55	1,752	1,404	348	1,780	1,336	444	822	621	201	1,255	662	593
1960	4,110	2,826	1,284	209	174	35	1,007	777	230	1,287	893	394	564	422	142	1,043	560	483
1965	4,649	3,041	1,608	286	250	36	1,208	860	348	1,338	907	431	682	494	188	1,135	530	605
1970	4,661	3,070	1,591	344	281	63	1,133	846	287	1,171	763	408	936	698	238	1,077	482	595
1975	4,233	3,036	1,197	278	235	43	1,127	896	231	1,078	773	305	883	688	195	867	444	423
1980	4,508	3,008	1,500	280	239	41	1,121	840	281	1,116	799	317	919	681	238	1,072	449	623
1981	4,341	3,345	996	354	269	85	1,653	1,488	165	865	621	244	754	652	102	715	315	400
1982	5,022	4,127	895	454	436	18	1,662	1,436	226	1,293	988	305	889	779	110	724	488	236
1983	6,063	4,908	1,155	583	560	23	2,018	1,791	227	1,505	1,139	366	1,149	968	181	808	450	358
1984	6,271	5,096	1,175	633	605	28	2,138	1,973	165	1,400	1,014	386	1,249	1,038	211	851	466	385

	South Central																							
	Total			Alabama			Arkansas			Louisiana			Mississippi			Oklahoma			Tennessee			Texas		
Year	All species	Softwood	Hardwood	All species	Softwood	Hardwood	All species	Softwood	Hardwood	All species	Softwood	Hardwood	All species	Softwood	Hardwood	All species	Softwood	Hardwood	All species	Softwood	Hardwood	All species	Softwood	Hardwood
1955	6,122	3,300	2,822	1,362	922	440	1,212	584	628	769	362	407	985	517	468	79	50	29	805	234	571	910	631	279
1960	5,189	3,044	2,145	1,077	748	329	1,168	811	357	716	377	339	799	400	399	87	47	40	622	128	494	720	533	187
1965	6,121	3,737	2,384	1,233	870	363	1,412	978	434	964	549	415	939	520	419	122	102	20	605	86	519	846	632	214
1970	6,151	4,116	2,035	1,291	938	353	1,311	973	338	818	492	326	1,075	704	371	176	160	16	547	58	489	933	791	142
1975	5,506	3,980	1,526	1,161	884	277	1,259	999	260	678	490	188	979	664	315	229	215	14	400	42	358	800	686	114
1980	5,760	3,929	1,831	1,104	824	280	1,424	1,132	292	547	341	206	1,102	747	355	161	135	26	620	65	555	802	685	117
1981	4,965	3,695	1,270	909	751	158	1,005	780	225	490	390	100	1,362	1,016	346	217	133	84	335	78	257	647	547	100
1982	5,757	4,662	1,095	1,268	1,105	163	1,186	965	221	573	428	145	1,320	1,063	257	203	187	16	335	97	238	872	817	55
1983	6,632	5,382	1,250	1,567	1,324	243	1,382	1,153	229	698	569	129	1,614	1,303	311	223	187	36	343	105	238	805	741	64
1984	7,146	5,606	1,540	1,759	1,425	334	1,413	1,189	224	747	585	162	1,756	1,424	332	234	182	52	400	103	297	837	698	139

Note: Data may not add to totals because of rounding.

Source: U.S. Department of Commerce, Bureau of the Census. [Annual issues.] Current industrial reports series: lumber production and mill stocks MA24T. Washington, DC: U.S. Department of Commerce, Bureau of the Census. Data for the following States and years were not disclosed by the Bureau of the Census and were estimated by USDA Forest Service: Tennessee, 1965; Florida and Virginia, 1980 and 1981; Louisiana, 1980; Oklahoma, 1981.

Table 2.5—Reported yellow pine lumber production in the South, by region and State, selected years 1869–1954

Million board feet, lumber tally

Year	Total South	Southeast: Total Southeast	Southeast: Florida	Southeast: Georgia	Southeast: North Carolina	Southeast: South Carolina	Southeast: Virginia	South Central: Total South Central	South Central: Alabama	South Central: Arkansas	South Central: Louisiana	South Central: Mississippi	South Central: Oklahoma	South Central: Tennessee	South Central: Texas
1869	1,083	636	154	216	74	83	109	447	86	51	53	129	(1)	35	93
1879	2,034	1,168	235	408	144	164	217	866	230	107	73	125	(1)	32	299
1889	4,005	1,770	382	554	404	174	256	2,235	559	384	186	302	2	32	770
1899	9,314	4,195	703	1,252	1,110	423	708	5,119	991	1,107	795	962	7	69	1,189
1904	11,132	4,191	746	1,064	1,069	549	764	6,941	1,116	1,056	1,930	1,358	11	87	1,383
1905	8,481	3,006	601	664	837	407	497	5,475	744	1,024	1,738	1,017	5	36	910
1910	13,830	4,733	921	901	1,322	626	962	9,097	1,323	1,174	2,865	1,701	118	89	1,827
1915	12,055	3,642	831	526	1,130	592	563	8,413	1,023	1,082	2,882	1,658	162	49	1,557
1920	8,877	2,581	744	479	517	436	405	6,295	986	586	2,066	1,323	135	74	1,125
1925	13,165	3,900	794	1,173	750	784	399	9,265	1,954	904	2,290	2,562	152	52	1,351
1930	7,402	2,590	611	612	624	475	269	4,812	1,144	534	946	1,102	148	57	882
1935	5,910	2,259	437	611	541	367	303	3,651	809	590	624	816	119	63	631
1940	10,094	4,236	477	1,455	1,015	622	668	5,858	1,561	1,071	662	1,191	140	91	1,143
1945	7,027	3,284	356	1,102	816	518	491	3,743	1,044	668	498	695	(2)	117	720
1950[3]	9,481	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
1954	7,045	3,914	300	1,255	1,122	570	665	3,132	918	541	347	501	37	143	644

[1] Data not available.

[2] Included in Arkansas total.

[3] Excludes Tennessee.

Note: Data may not add to totals because of rounding.

Sources: *1869–1945*—Steer, Henry B. 1948. Lumber production in the United States 1799–1946. Misc. Publ. 669. Washington, DC: U.S. Department of Agriculture. 233 p. *1950–54*—U.S. Department of Commerce, Bureau of the Census. [Annual issues.] Current industrial reports series: lumber production and mill stocks M13G. Washington, DC: U.S. Department of Commerce, Bureau of the Census.

Table 2.6—Reported cypress lumber production in the South, by region and State, selected years 1869–1954

Million board feet, lumber tally

		Southeast						South Central							
Year	Total South	Total Southeast	Florida	Georgia	North Carolina	South Carolina	Virginia	Total South Central	Alabama	Arkansas	Louisiana	Mississippi	Oklahoma	Tennessee	Texas
1869	26	12	3	3	3	2	1	14	([1])	3	7	2	([1])	([1])	2
1879	105	35	9	7	7	10	2	70	([1])	8	45	7	([1])	2	8
1889	226	73	35	10	10	15	3	153	([1])	25	100	15	([1])	2	11
1899	483	147	85	15	19	26	3	336	1	46	249	34	([1])	2	5
1904	723	147	66	38	10	31	2	576	22	64	432	56	([1])	2	([1])
1905	735	121	56	15	20	26	3	614	8	60	488	54	([1])	3	1
1910	905	161	66	27	36	24	7	744	3	45	654	30	([1])	10	1
1915	899	277	161	50	27	30	9	622	4	25	561	24	([1])	7	1
1920	526	197	105	46	6	36	3	330	3	35	273	12	([1])	6	1
1925	846	425	257	63	24	73	8	421	6	72	274	35	([1])	19	15
1930	483	294	199	19	21	52	3	188	7	36	109	25	([1])	4	7
1935	318	196	118	21	20	31	5	122	7	22	54	23	([1])	9	7
1940	401	246	122	26	31	55	12	154	9	28	68	29	([1])	14	5
1945	226	170	89	20	25	30	6	56	2	10	24	11	([1])	7	2
1954	230	144	56	10	37	36	5	85	9	15	34	16	([1])	8	3

[1] Data not available.

Note: Data may not add to totals because of rounding.

Sources: See footnote on appendix table 2.5.

Table 2.7—Reported oak–hickory lumber production in the South, by region and State, selected years 1869–1954

Million board feet, lumber tally

		Southeast						South Central							
Year	Total South	Total Southeast	Florida	Georgia	North Carolina	South Carolina	Virginia	Total South Central	Alabama	Arkansas	Louisiana	Mississippi	Oklahoma	Tennessee	Texas
1869	219	64	([1])	15	25	4	20	155	([1])	20	5	20	([1])	100	10
1879	376	141	2	23	50	6	60	235	2	48	5	20	([1])	142	18
1889	758	242	3	28	75	6	130	516	8	113	6	80	3	276	30
1899	1,185	283	2	31	92	11	147	902	68	256	6	107	9	428	28
1904	1,114	272	([1])	19	122	12	119	841	53	278	17	144	11	324	14
1905	752	190	([1])	16	83	3	88	563	34	181	9	107	4	219	9
1910	1,728	525	1	34	173	17	300	1,203	73	339	93	164	33	467	35
1915	1,006	295	1	21	99	7	167	711	38	237	78	93	8	223	34
1920	1,093	289	1	27	85	6	170	804	48	254	98	125	8	243	28
1925	1,481	283	2	40	84	13	145	1,198	107	297	227	194	3	269	100
1930	1,091	264	11	26	72	23	132	826	71	178	179	130	11	190	68
1935	791	150	4	14	44	13	76	641	55	148	131	104	6	149	48
1940	973	352	4	31	112	23	183	621	58	161	120	98	9	116	60
1945	1,780	553	4	91	136	38	284	1,228	175	209	179	267	([1])	280	118
1950	1,915	([1])	([1])	([1])	([1])	([1])	([1])	([1])	([1])	([1])	([1])	([1])	([1])	([1])	([1])
1954	2,178	751	17	153	223	58	300	1,427	216	336	189	235	([1])	264	188

[1] Data not available.

[2] Included in Arkansas total.

Note: Data may not add to totals because of rounding.

Sources: See footnote on appendix table 2.5.

Table 2.8—Reported gum and tupelo lumber production in the South, by region and State, selected years 1869–1954

Million board feet, lumber tally

		Southeast						South Central								
Year	Total South	Total Southeast	Florida	Georgia	North Carolina	South Carolina	Virginia	Total South Central	Alabama	Arkansas	Louisiana	Mississippi	Oklahoma	Tennessee	Texas
1879	10	([1])	([1])	([1])	([1])	([1])	([1])	10	1	2	([1])	5	([1])	2	([1])
1889	34	3	([1])	1	([1])	([1])	2	31	5	10	1	10	([1])	5	([1])
1899	163	6	([1])	3	1	([1])	2	157	11	65	3	25	([1])	53	1
1904	309	14	([1])	([1])	7	3	4	295	14	136	16	63	1	62	3
1905	237	28	([1])	2	9	6	11	209	16	95	9	51	([1])	37	2
1910	575	90	([1])	6	34	24	26	485	17	184	52	154	1	65	12
1915	558	103	6	7	32	30	29	456	33	157	102	118	1	26	19
1920	796	95	9	20	13	33	20	701	46	203	213	157	7	56	19
1925	1,288	166	8	38	28	75	17	1,122	109	215	372	246	1	79	100
1930	928	256	31	51	40	121	14	673	72	74	277	137	3	37	73
1935	662	212	33	38	32	98	12	450	47	64	189	75	1	30	44
1940	692	260	21	38	44	125	31	433	65	68	160	75	5	12	46
1945	1,367	410	18	172	86	95	39	957	252	153	219	210	([2])	46	77
1950	1,030	([1])	([1])	([1])	([1])	([1])	([1])	([1])	([1])	([1])	([1])	([1])	([1])	([1])	([1])
1954	842	321	6	97	93	85	40	520	121	75	116	134	2	25	48

[1] Data not available.

[2] Included in Arkansas total.

Note: Data may not add to totals because of rounding.

Sources: See footnote on appendix table 2.5.

Table 2.9—Reported ash, cottonwood, and elm lumber production in the South, by region and State, selected years 1869–1954

Million board feet, lumber tally

		Southeast						South Central							
Year	Total South	Total Southeast	Florida	Georgia	North Carolina	South Carolina	Virginia	Total South Central	Alabama	Arkansas	Louisiana	Mississippi	Oklahoma	Tennessee	Texas
1899	384	11	([1])	1	4	4	1	373	12	141	58	50	6	96	10
1904	338	14	([1])	([1])	4	9	([1])	325	3	137	60	31	8	27	7
1905	275	19	([1])	1	5	11	2	257	2	113	40	54	3	38	7
1910	271	14	([1])	4	4	2	3	259	4	90	61	53	10	31	8
1915	209	16	4	3	5	2	2	193	4	59	38	49	2	34	7
1920	175	16	2	5	3	4	1	159	5	51	34	39	4	23	3
1925	263	24	5	7	3	11	1	239	9	71	66	47	1	36	8
1930	198	39	6	11	3	18	1	159	7	35	40	43	1	24	8
1935	142	26	6	7	2	11	1	116	6	22	33	37	([1])	11	7
1940	153	27	4	5	3	13	1	126	7	28	27	38	1	17	8
1945	168	25	1	9	3	11	1	143	15	30	38	31	([2])	18	11
1954	195	34	7	7	4	11	5	147	20	24	25	41	5	25	7

[1] Data not available.

[2] Included in Arkansas total.

Note: Data may not add to totals because of rounding.

Sources: See footnote on appendix table 2.5.

Table 2.10—Federal and State expenditures for protection[1] from wildfire, total acres protected, total acres burned, and acres of timberland burned on non-Federal protected lands[2] in the South, by region, selected years 1916–83

	Expenditures						Acres		
	Total		Federal[3]		State[4]				
Year	Current dollars	1982 dollars[5]	Current dollars	1982 dollars[5]	Current dollars	1982 dollars[5]	Total protected	Total burned	Timberland burned[6]
South									
	Thousands								
1916	12	—	6	—	5	—	([7])	9,892	6,624
1920	27	—	10	—	17	—	([7])	4,151	2,271
1925	288	—	108	—	180	—	([7])	23,375	21,325
1930	1,141	14,818	391	5,078	750	9,740	69,923	2,843	2,747
1935	1,008	11,200	444	4,933	564	6,267	73,658	1,584	1,514
1940	2,098	21,629	673	6,938	1,424	14,680	88,351	2,154	2,095
1945	3,986	33,780	1,417	12,008	2,569	21,771	89,031	1,301	1,204
1950	9,388	57,595	2,864	17,571	6,524	40,025	135,113	2,704	2,547
1955	14,661	71,170	3,419	16,597	11,242	54,573	157,296	1,946	1,850
1960	19,285	78,077	3,833	15,518	15,452	62,559	168,225	1,144	1,093
1965	25,339	90,174	4,989	17,754	20,350	72,420	183,709	658	557
1970	40,130	109,049	6,053	16,448	34,077	92,601	185,307	892	724
1975	59,996	99,003	8,663	14,295	51,333	84,708	218,582	613	469
1980	76,837	88,932	6,437	7,450	70,400	81,481	232,251	912	747
1981	90,820	96,310	5,461	5,791	85,359	90,519	232,651	1,784	1,405
1982	94,959	94,959	3,630	3,630	91,329	91,329	233,255	574	464
1983	88,997	87,855	3,638	3,591	85,359	84,264	233,255	334	279
Southeast									
1916	7	—	3	—	4	—	([7])	3,650	3,168
1920	16	—	7	—	10	—	([7])	1,748	1,150
1925	92	—	40	—	52	—	([7])	9,077	7,286
1930	548	7,117	189	2,455	359	4,662	26,105	820	736
1935	532	5,911	242	2,689	290	3,222	36,175	613	566
1940	1,091	11,247	345	3,557	746	7,691	39,997	660	606
1945	2,167	18,364	705	5,975	1,462	12,390	37,169	786	715
1950	5,046	30,957	1,445	8,865	3,601	22,092	66,329	1,386	1,303
1955	7,777	37,752	1,785	8,665	5,992	29,087	76,258	1,415	1,339
1960	10,812	43,773	1,945	7,874	8,867	35,899	81,482	308	290
1965	14,474	51,509	2,372	8,441	12,102	43,068	85,357	249	213
1970	23,531	63,943	2,866	7,788	20,665	56,155	92,986	287	225
1975	37,098	61,218	4,044	6,673	33,054	54,545	105,034	337	237
1980	44,896	51,963	3,025	3,501	41,871	48,462	106,039	258	208
1981	53,904	57,162	2,562	2,717	51,342	54,445	106,439	923	614
1982	53,578	53,578	1,700	1,700	51,878	51,878	106,755	247	177
1983	49,736	49,098	1,724	1,702	48,012	47,396	106,755	98	78

Table 2.10—Federal and State expenditures for protection[1] from wildfire, total acres protected, total acres burned, and acres of timberland burned on non-Federal protected lands[2] in the South, by region, selected years 1916–83—Continued

South Central									
	Expenditures						Acres		
	Total		Federal[3]		State[4]				
Year	Current dollars	1982 dollars[5]	Current dollars	1982 dollars[5]	Current dollars	1982 dollars[5]	Total protected	Total burned	Timberland burned[6]
	Thousands								
1916	5	—	4	—	1	—	(7)	6,242	3,456
1920	11	—	4	—	7	—	(7)	2,404	1,121
1925	196	—	68	—	129	—	(7)	14,298	14,040
1930	593	7,701	201	2,610	391	5,078	43,818	2,023	2,011
1935	476	5,289	202	2,244	274	3,044	37,483	971	948
1940	1,007	10,381	328	3,381	678	6,990	48,354	1,494	1,490
1945	1,819	15,415	712	6,034	1,107	9,381	51,862	515	490
1950	4,343	26,644	1,419	8,706	2,923	17,933	68,784	1,318	1,244
1955	6,884	33,417	1,634	7,932	5,249	25,481	81,038	531	511
1960	8,472	34,300	1,887	7,640	6,585	26,660	86,743	836	803
1965	10,865	38,665	2,617	9,313	8,248	29,352	98,352	409	344
1970	16,599	45,106	3,187	8,660	13,412	36,446	92,321	605	500
1975	22,898	37,785	4,619	7,622	18,279	30,163	113,548	276	232
1980	31,941	36,969	3,412	3,949	28,529	33,020	126,212	654	539
1981	36,916	39,147	2,899	3,074	34,017	36,073	126,212	861	791
1982	41,381	41,381	1,930	1,930	39,451	39,451	126,500	327	287
1983	39,261	38,757	1,914	1,889	37,347	36,868	126,500	236	201

[1] All fire protection activities: prevention, other presuppression, suppression, fuels reduction or modification, and assistance to rural communities.

[2] Non-Federal protected lands are forest industry, other private, and State and local government lands under the jurisdiction of State fire protection programs. Some Federal lands protected by these programs may be included.

[3] All Federal expenditures for administration, technical assistance, cooperative projects, grants to States, and the value of Federal property given or loaned to States.

[4] State expenditures as reported to the Forest Service. State expenditures start from the year each State established its cooperative program: 1915–NC, VA; 1916–TX; 1918–LA; 1921–TN; 1924–AL; 1925–GA; 1926–MS, OK; 1927–SC; 1928–FL; 1933–AR.

[5] Converted to 1982 dollars by dividing the expenditures in current dollars by the implicit price deflators for gross national product for total Federal Government purchases of goods and services through 1971 and for nondefense Federal Government purchases of goods and services for 1972–83, as reported by the U.S. Department of Commerce, Bureau of Economic Analysis. There is no implicit price deflator for gross national product for years prior to 1929.

[6] Timberland data available from 1926 to present; prior to 1926 acres burned are for "forest land" with no distinction made between timberland and other forest land.

[7] Data not available.

Note: Data may not add to totals because of rounding.

Table 2.11—Regeneration[1] in the South, by ownership and region, 1925–85

Thousand acres

	South					Southeast					South Central				
Year[2]	Total	Industry[3]	Other private	Federal	Other public	Total	Industry[3]	Other private	Federal	Other public	Total	Industry[3]	Other private	Federal	Other public
1925	31	15	14	2	([4])	7	([4])	6	1	([4])	24	15	8	1	([5])
1926	7	7	([4])	([5])	([5])	([4])	([5])	([4])	([5])	([5])	7	7	([5])	([5])	([5])
1927	3	3	([4])	([5])	([4])	([4])	([4])	([4])	([5])	([4])	3	3	([4])	([5])	([4])
1928	10	9	1	([4])	([4])	([4])	([4])	([4])	([4])	([4])	9	9	([4])	([4])	([4])
1929	13	10	2	([4])	([4])	2	([4])	1	([4])	([4])	11	10	1	([4])	([4])
1930	13	7	5	1	([4])	5	([4])	4	([4])	([4])	8	7	1	([4])	([4])
1931	8	3	4	([4])	1	4	1	3	([4])	([4])	4	2	1	([4])	([4])
1932	8	3	4	1	1	5	1	3	([4])	([4])	4	2	1	1	([4])
1933	3	([4])	2	([5])	([4])	2	([4])	1	([5])	([4])	1	([5])	1	([5])	([4])
1934	20	1	8	9	2	7	1	4	1	1	13	([4])	4	8	1
1935	45	2	23	17	4	15	1	12	([4])	1	30	1	11	16	2
1936	114	3	37	58	15	35	1	24	1	9	79	2	13	57	6
1937	118	5	44	60	9	34	4	24	([4])	6	84	2	19	60	3
1938	189	11	101	73	4	61	8	38	12	2	129	3	62	61	2
1939	171	14	90	63	4	70	7	47	13	2	101	7	43	49	2
1940	175	8	108	54	4	71	5	58	6	3	104	3	51	48	2
1941	193	12	107	66	8	75	5	55	10	5	118	7	52	56	3
1942	66	10	28	26	1	17	1	13	3	1	49	9	16	23	1
1943	20	6	11	2	([4])	8	([5])	8	([4])	([5])	11	6	2	2	([4])
1944	11	2	8	([4])	([4])	7	([5])	7	([5])	([5])	4	2	2	([4])	([4])
1945	56	8	46	1	1	33	1	30	1	1	23	6	16	1	([4])
1946	57	9	43	4	1	35	5	29	([4])	1	21	4	13	4	([4])
1947	56	6	44	5	1	30	3	26	1	([4])	25	3	18	5	([4])
1948	186	51	120	12	4	98	24	69	1	3	88	27	51	10	1
1949	225	100	86	19	20	115	51	49	3	12	109	49	37	15	8
1950	293	131	118	16	28	147	67	56	4	21	145	64	63	12	7
1951	253	113	119	14	6	108	47	55	4	3	145	67	64	11	4
1952	254	132	109	9	5	120	63	52	3	2	134	69	57	6	2
1953	427	232	158	29	8	194	99	74	17	5	234	133	85	13	3
1954	517	267	216	23	10	293	148	126	12	7	223	118	91	11	3
1955	496	238	224	27	7	295	156	116	18	5	202	82	108	9	2
1956	595	256	294	32	13	327	149	147	22	9	267	107	147	10	3
1957	811	321	444	38	7	495	211	252	25	6	316	110	192	13	1
1958	1,095	348	689	46	12	606	200	365	32	9	490	148	324	14	3
1959	1,664	435	1,162	54	13	834	173	620	31	10	830	262	542	23	3

Table 2.11—Regeneration[1] in the South, by ownership and region, 1925–85—Continued

Thousand acres

	South					Southeast					South Central				
Year[2]	Total	Industry[3]	Other private	Federal	Other public	Total	Industry[3]	Other private	Federal	Other public	Total	Industry[3]	Other private	Federal	Other public
1960	1,564	496	1,000	57	11	821	221	569	24	7	743	274	431	34	4
1961	1,192	547	578	54	14	647	293	325	21	9	545	254	253	34	5
1962	816	381	341	76	19	403	194	173	23	13	413	187	168	53	5
1963	793	436	263	72	22	434	257	137	22	18	359	178	126	50	4
1964	757	435	232	72	18	449	269	133	32	15	309	167	98	40	4
1965	710	401	220	73	17	441	263	126	38	15	269	138	94	35	2
1966	698	394	215	72	17	443	276	115	38	14	255	118	100	34	3
1967	767	419	263	74	10	481	278	159	37	7	286	142	104	37	3
1968	793	493	212	78	10	472	312	114	40	7	321	181	98	38	4
1969	789	536	162	79	13	436	292	96	40	8	354	244	66	39	5
1970	861	597	173	80	11	437	299	88	43	8	424	298	85	37	4
1971	1,003	722	167	99	14	519	376	89	47	8	483	347	78	52	7
1972	992	664	214	101	13	517	338	126	45	8	475	326	88	56	5
1973	1,025	706	207	97	15	481	312	114	44	10	544	393	92	53	6
1974	1,036	725	197	95	18	516	330	130	43	12	519	395	67	51	6
1975	1,255	900	243	93	20	631	425	159	41	6	624	475	83	53	14
1976	1,175	840	231	86	18	574	393	142	32	6	600	447	88	54	12
1977	1,304	936	271	80	18	615	427	148	35	5	689	509	123	44	13
1978	1,314	966	263	71	14	636	450	148	32	6	678	516	115	38	9
1979	1,341	933	326	75	7	564	339	184	36	4	777	593	141	39	3
1980	1,508	1,005	392	103	7	706	448	193	62	3	802	558	199	41	4
1981	1,207	725	388	84	11	616	372	207	33	4	591	353	181	50	7
1982	1,691	1,181	415	83	11	731	453	237	35	6	960	728	178	48	6
1983	1,617	1,050	477	81	10	678	374	264	35	4	939	675	212	46	6
1984	1,840	1,158	590	84	8	950	522	388	35	5	891	636	201	49	4
1985	2,012	1,200	712	83	17	1,065	533	486	37	9	946	667	226	46	8

[1] Includes planting and direct seeding. Excludes site preparation for natural regeneration.

[2] Fiscal year.

[3] Forest industry and mining, railroad, and utility companies.

[4] Less than 500 acres.

[5] None reported.

Note: Data reported in the sources listed below vary considerably in quality and accuracy. Therefore, the data shown in this table may be incomplete. Data may not add to total because of rounding.

Sources: *1980–85*—U.S.Department of Agriculture, Forest Service. [Annual issues.] 1980 (etc.) U.S. forest planting report. Washington, DC: U.S. Department of Agriculture, Forest Service. *1925–79*—U.S. Department of Agriculture, Forest Service. 1980. A statistical history of tree planting in the South 1925–1979. Misc. Rep. SA-MR-8. Atlanta, GA: U.S. Department of Agriculture, Forest Service, Southeastern Area, State and Private Forestry. 36 p.

Table 2.12—Regeneration[1] in the Southeast region, by ownership and State, 1925–85

Thousand acres

			Southeast							
Year[2]	Total	Industry[3]	Other private	Federal	Other public	Year[2]	Total	Industry[3]	Other private	Federal	Other public
1925	7	([4])	6	1	([4])	1955	295	156	116	18	5
1926	([4])	([5])	([4])	([5])	([5])	1956	327	149	147	22	9
1927	([4])	([4])	([4])	([5])	([4])	1957	495	211	252	25	6
1928	([4])	([4])	([4])	([4])	([4])	1958	606	200	365	32	9
1929	2	([4])	1	([4])	([4])	1959	834	173	620	31	10
1930	5	([4])	4	([4])	([4])	1960	821	221	569	24	7
1931	4	1	3	([4])	([4])	1961	647	293	325	21	9
1932	5	1	3	([4])	([4])	1962	403	194	173	23	13
1933	2	([4])	1	([5])	([4])	1963	434	257	137	22	18
1934	7	1	4	1	1	1964	449	269	133	32	15
1935	15	1	12	([4])	1	1965	441	263	126	38	15
1936	35	1	24	1	9	1966	443	276	115	38	14
1937	34	4	24	([4])	6	1967	481	278	159	37	7
1938	61	8	38	12	2	1968	472	312	114	40	7
1939	70	7	47	13	2	1969	436	292	96	40	8
1940	71	5	58	6	3	1970	437	299	88	43	8
1941	75	5	55	10	5	1971	519	376	89	47	8
1942	17	1	13	3	1	1972	517	338	126	45	8
1943	8	([5])	8	([4])	([5])	1973	481	312	114	44	10
1944	7	([5])	7	([5])	([5])	1974	516	330	130	43	12
1945	33	1	30	1	1	1975	631	425	159	41	6
1946	35	5	29	([4])	1	1976	574	393	142	32	6
1947	30	3	26	1	([4])	1977	615	427	148	35	5
1948	98	24	69	1	3	1978	636	450	148	32	6
1949	115	51	49	3	12	1979	564	339	184	36	4
1950	147	67	56	4	21	1980	706	448	193	62	3
1951	108	47	55	4	3	1981	616	372	207	33	4
1952	120	63	52	3	2	1982	731	453	237	35	6
1953	194	99	74	17	5	1983	678	374	264	35	4
1954	293	148	126	12	7	1984	950	522	388	35	5
						1985	1,065	533	486	37	9

Table 2.12—Regeneration[1] in the Southeast region, by ownership and State, 1925–85—Continued

Thousand acres

Virginia											
Year[2]	Total	Industry[3]	Other private	Federal	Other public	Year[2]	Total	Industry[3]	Other private	Federal	Other public
1925	([4])	([4])	([4])	([4])	([4])	1955	16	9	7	1	([4])
1926	([5])	([5])	([5])	([5])	([5])	1956	20	10	10	([4])	([4])
1927	([4])	([5])	([4])	([5])	([4])	1957	32	16	16	1	([4])
1928	([4])	([4])	([4])	([4])	([4])	1958	39	19	19	1	1
1929	([4])	([4])	([4])	([4])	([4])	1959	39	18	20	1	([4])
1930	([4])	([4])	([4])	([4])	([4])	1960	35	11	23	1	([4])
1931	([4])	([4])	([4])	([4])	([4])	1961	42	16	23	3	1
1932	([4])	([4])	([4])	([4])	([4])	1962	46	24	20	1	1
1933	([4])	([5])	([4])	([5])	([4])	1963	48	28	18	1	1
1934	1	([4])	([4])	([4])	([4])	1964	65	40	22	2	1
1935	1	([4])	1	([4])	([4])	1965	74	43	28	2	1
1936	1	([4])	1	([5])	([4])	1966	65	35	25	3	1
1937	1	([4])	1	([4])	([4])	1967	75	44	26	3	1
1938	4	1	3	([4])	([4])	1968	64	37	24	2	1
1939	4	1	2	1	([4])	1969	70	42	25	2	1
1940	4	1	3	([5])	([4])	1970	69	38	27	2	1
1941	6	1	4	([5])	([4])	1971	72	35	33	3	1
1942	1	([5])	1	([5])	([5])	1972	98	40	53	4	1
1943	([4])	([5])	([4])	([5])	([5])	1973	83	34	44	2	3
1944	([4])	([5])	([4])	([5])	([5])	1974	83	32	47	2	2
1945	1	([4])	1	([5])	([4])	1975	88	32	52	3	1
1946	1	([4])	1	([5])	([4])	1976	86	34	48	3	1
1947	2	([4])	1	([5])	([4])	1977	94	37	53	3	1
1948	3	1	1	([5])	([4])	1978	93	36	54	2	([4])
1949	4	2	2	([5])	([4])	1979	87	44	39	2	1
1950	5	2	3	([4])	([4])	1980	87	23	61	2	1
1951	5	2	2	([4])	([4])	1981	87	29	55	2	1
1952	8	4	3	([4])	([4])	1982	85	30	52	2	1
1953	10	6	3	1	([4])	1983	89	39	47	2	1
1954	14	10	3	1	([4])	1984	92	35	54	2	1
						1985	94	34	57	2	1

Table 2.12—Regeneration[1] in the Southeast region, by ownership and State, 1925–85—Continued

Thousand acres

			North Carolina							
Year[2]	Total	Industry[3]	Other private	Federal	Other public	Year[2]	Total	Industry[3]	Other private	Federal	Other public
1925	5	(4)	5	(4)	(4)	1955	38	20	16	1	(4)
1926	(4)	(5)	(4)	(5)	(5)	1956	53	30	20	2	1
1927	(4)	(4)	(4)	(5)	(4)	1957	86	40	43	2	1
1928	(4)	(4)	(4)	(4)	(4)	1958	90	39	46	4	1
1929	(4)	(4)	(4)	(4)	(4)	1959	87	25	58	3	1
1930	(4)	(4)	(4)	(5)	(4)	1960	69	22	44	2	1
1931	(4)	(4)	(4)	(4)	(4)	1961	60	34	22	3	1
1932	(4)	(4)	(4)	(5)	(4)	1962	50	24	21	3	1
1933	(4)	(5)	(4)	(5)	(5)	1963	48	31	12	4	1
1934	2	(5)	1	1	(4)	1964	52	32	14	5	2
1935	3	(4)	3	(4)	(4)	1965	48	21	19	7	2
1936	1	(4)	1	(4)	(4)	1966	52	28	18	4	1
1937	3	(4)	2	(4)	(4)	1967	53	28	21	3	1
1938	6	(4)	2	1	4)	1968	62	43	11	6	2
1939	5	1	2	2	(4)	1969	59	37	15	6	2
1940	4	(4)	3	1	(4)	1970	76	56	12	8	1
1941	3	1	2	1	1	1971	97	73	16	7	1
1942	1	(5)	1	(4)	(5)	1972	57	30	20	6	1
1943	1	(5)	(4)	(4)	(5)	1973	88	67	16	4	1
1944	(4)	(5)	(4)	(5)	(5)	1974	82	58	13	5	6
1945	2	(4)	1	(4)	(4)	1975	136	102	29	4	1
1946	3	(4)	3	(4)	(4)	1976	131	93	32	4	1
1947	7	1	6	(4)	(4)	1977	136	99	32	4	1
1948	10	3	6	(4)	1	1978	140	108	26	4	1
1949	13	2	9	1	(4)	1979	86	38	44	3	1
1950	13	3	8	1	1	1980	97	48	44	4	(4)
1951	18	3	13	1	(4)	1981	108	55	45	8	1
1952	17	4	11	1	(4)	1982	105	63	39	3	1
1953	20	8	11	1	1	1983	107	59	44	4	1
1954	28	12	14	(4)	1	1984	110	51	55	3	(4)
						1985	123	62	58	3	(4)

Table 2.12—Regeneration[1] in the Southeast region, by ownership and State, 1925–85—Continued

Thousand acres

South Carolina

Year[2]	Total	Industry[3]	Other private	Federal	Other public	Year[2]	Total	Industry[3]	Other private	Federal	Other public
1925	1	([4])	1	([5])	([4])	1955	46	16	17	11	2
1926	([5])	([5])	([5])	([5])	([5])	1956	44	15	16	11	2
1927	([5])	([5])	([5])	([5])	([5])	1957	66	22	31	11	2
1928	([5])	([5])	([5])	([5])	([5])	1958	78	10	55	12	2
1929	([4])	([4])	([4])	([5])	([5])	1959	168	29	122	13	4
1930	([4])	([4])	([4])	([5])	([5])	1960	188	24	151	10	2
1931	1	([4])	1	([5])	([5])	1961	162	28	127	4	3
1932	2	1	1	([5])	([4])	1962	88	25	53	5	5
1933	([4])	([5])	([4])	([5])	([4])	1963	69	21	37	4	7
1934	1	([4])	1	([5])	([4])	1964	73	29	28	11	6
1935	3	([4])	2	([5])	1	1965	73	28	26	12	7
1936	15	1	5	1	8	1966	65	30	21	9	5
1937	19	3	11	([4])	5	1967	59	19	30	10	1
1938	17	3	10	3	1	1968	49	23	17	8	1
1939	17	1	11	5	([4])	1969	38	21	10	7	1
1940	12	1	9	1	1	1970	45	28	9	7	2
1941	22	1	13	5	2	1971	70	52	8	8	2
1942	8	([4])	6	2	1	1972	58	39	8	9	1
1943	4	([5])	4	([5])	([5])	1973	60	43	9	6	1
1944	5	([5])	5	([5])	([5])	1974	57	42	6	7	1
1945	18	([4])	17	([4])	([4])	1975	70	46	14	8	2
1946	9	2	6	([5])	([4])	1976	74	56	10	6	1
1947	4	1	3	([5])	([4])	1977	81	57	16	6	1
1948	17	3	12	([4])	2	1978	92	63	24	5	1
1949	31	11	15	2	3	1979	109	60	41	7	1
1950	30	9	17	1	2	1980	112	79	26	6	1
1951	21	10	9	1	1	1981	131	88	35	7	1
1952	17	8	7	1	([4])	1982	126	92	26	7	1
1953	33	10	10	12	1	1983	125	82	35	7	1
1954	42	15	18	7	2	1984	140	98	32	8	2
						1985	156	87	59	8	2

Table 2.12—Regeneration[1] in the Southeast region, by ownership and State, 1925–85—Continued

Thousand acres

Georgia											
Year[2]	Total	Industry[3]	Other private	Federal	Other public	Year[2]	Total	Industry[3]	Other private	Federal	Other public
1925	([4])	([5])	([4])	([5])	([5])	1955	99	48	48	2	([4])
1926	([5])	([5])	([5])	([5])	([5])	1956	127	56	62	5	4
1927	([5])	([5])	([5])	([5])	([5])	1957	92	38	47	5	1
1928	([4])	([5])	([4])	([5])	([5])	1958	192	52	135	4	1
1929	1	([5])	1	([5])	([5])	1959	336	34	295	6	1
1930	3	([4])	3	([5])	([4])	1960	330	91	234	4	1
1931	([4])	([4])	([4])	([5])	([5])	1961	203	98	99	5	2
1932	1	([4])	([4])	([5])	([4])	1962	70	23	40	6	1
1933	1	([4])	([4])	([5])	([5])	1963	129	80	42	6	2
1934	1	([4])	([4])	([4])	([4])	1964	115	79	30	5	1
1935	4	1	3	([4])	([4])	1965	107	71	29	6	1
1936	10	1	9	([5])	([4])	1966	114	81	26	5	2
1937	6	([4])	6	([5])	([4])	1967	135	88	43	3	1
1938	17	([4])	16	.1	([4])	1968	126	90	29	5	1
1939	24	([4])	22	1	1	1969	106	76	24	5	1
1940	33	([4])	30	([4])	2	1970	86	66	14	5	1
1941	27	1	25	1	1	1971	103	77	18	7	1
1942	7	1	5	1	([5])	1972	133	108	18	6	1
1943	4	([5])	4	([5])	([5])	1973	95	64	20	9	1
1944	1	([5])	1	([5])	([5])	1974	139	116	14	8	1
1945	7	1	6	([4])	([4])	1975	141	103	29	8	1
1946	19	1	17	([4])	([4])	1976	125	97	22	5	1
1947	14	1	13	([5])	([4])	1977	145	115	23	6	1
1948	42	7	35	([4])	([4])	1978	157	123	26	7	1
1949	31	18	11	1	2	1979	159	112	41	6	1
1950	56	28	15	([4])	12	1980	202	141	30	31	1
1951	40	20	19	([4])	1	1981	222	170	47	5	1
1952	50	33	16	1	([4])	1982	139	54	75	8	2
1953	63	34	27	1	1	1983	136	45	82	8	1
1954	103	50	51	2	1	1984	381	219	153	8	1
						1985	457	223	223	6	5

Table 2.12—Regeneration[1] in the Southeast region, by ownership and State, 1925–85—Continued

Thousand acres

Florida											
Year[2]	Total	Industry[3]	Other private	Federal	Other public	Year[2]	Total	Industry[3]	Other private	Federal	Other public
1925	1	([4])	([4])	1	([5])	1955	96	63	28	2	3
1926	([5])	([5])	([5])	([5])	([5])	1956	83	38	40	3	2
1927	([5])	([5])	([5])	([5])	([5])	1957	219	94	115	6	3
1928	([5])	([5])	([5])	([5])	([5])	1958	207	80	110	12	4
1929	([4])	([5])	([4])	([4])	([4])	1959	204	67	126	8	3
1930	1	([4])	1	([4])	([4])	1960	199	72	118	6	3
1931	2	([4])	1	([4])	([4])	1961	180	117	54	6	3
1932	1	([4])	1	([5])	([4])	1962	149	97	39	6	6
1933	([5])	([5])	([5])	([5])	([5])	1963	141	97	29	7	8
1934	2	([4])	2	([5])	([4])	1964	144	89	40	10	6
1935	4	([4])	3	([5])	([4])	1965	140	100	24	12	4
1936	8	([4])	8	([5])	([4])	1966	147	101	24	17	5
1937	6	1	4	([5])	1	1967	158	98	40	18	2
1938	16	4	7	4	1	1968	170	117	33	19	2
1939	19	5	10	4	([4])	1969	162	116	22	20	3
1940	18	3	11	4	([4])	1970	161	112	25	22	3
1941	16	2	11	3	([4])	1971	177	139	14	23	2
1942	([4])	([5])	([5])	([4])	([5])	1972	171	121	26	21	3
1943	([5])	([5])	([5])	([5])	([5])	1973	154	103	25	22	3
1944	([5])	([5])	([5])	([5])	([5])	1974	156	82	50	21	2
1945	6	([4])	5	([4])	([4])	1975	197	142	35	18	1
1946	3	1	3	([4])	([4])	1976	159	114	30	14	2
1947	3	([4])	3	1	([4])	1977	160	119	23	16	2
1948	26	9	15	1	1	1978	155	120	17	14	3
1949	37	18	12	1	6	1979	122	84	19	18	1
1950	43	24	12	1	6	1980	208	157	32	19	([4])
1951	24	12	11	1	1	1981	67	30	25	11	1
1952	29	13	14	1	1	1982	276	214	45	16	1
1953	68	41	23	2	2	1983	221	149	57	14	1
1954	107	62	39	3	3	1984	226	119	94	13	1
						1985	235	127	88	19	1

[1] Includes planting and direct seeding. Excludes site preparation for natural regeneration.

[2] Fiscal year.

[3] Forest industry and mining, railroad, and utility companies.

[4] Less than 500 acres.

[5] None reported.

Note: Data reported in the sources listed below vary considerably in quality and accuracy. Therefore, the data shown in this table may be incomplete. Data may not add to total because of rounding. Sources: See footnote on appendix table 2.11.

Table 2.13—Regeneration[1] in the South Central region, by ownership and State, 1925–85

Thousand acres

			South Central								
Year[2]	Total	Industry[3]	Other private	Federal	Other public	Year[2]	Total	Industry[3]	Other private	Federal	Other public
1925	24	15	8	1	(5)	1955	202	82	108	9	2
1926	7	7	(5)	(5)	(5)	1956	267	107	147	10	3
1927	3	3	(4)	(5)	(5)	1957	316	110	192	13	1
1928	9	9	(4)	(4)	(4)	1958	490	148	324	14	3
1929	11	10	1	(4)	(4)	1959	830	262	542	23	3
1930	8	7	1	(4)	(4)	1960	743	274	431	34	4
1931	4	2	1	(4)	(4)	1961	545	254	253	34	5
1932	4	2	1	1	(4)	1962	413	187	168	53	5
1933	1	(5)	1	(5)	(4)	1963	359	178	126	50	4
1934	13	(4)	4	8	1	1964	309	167	98	40	4
1935	30	1	11	16	2	1965	269	138	94	35	2
1936	79	2	13	57	6	1966	255	118	100	34	3
1937	84	2	19	60	3	1967	286	142	104	37	3
1938	129	3	62	61	2	1968	321	181	98	38	4
1939	101	7	43	49	2	1969	354	244	66	39	5
1940	104	3	51	48	2	1970	424	298	85	37	4
1941	118	7	52	56	3	1971	483	347	78	52	7
1942	49	9	16	23	1	1972	475	326	88	56	5
1943	11	6	2	2	(4)	1973	544	393	92	53	6
1944	4	2	2	(4)	(4)	1974	519	395	67	51	6
1945	23	6	16	1	(4)	1975	624	475	83	53	14
1946	21	4	13	4	(4)	1976	600	447	88	54	12
1947	25	3	18	5	(4)	1977	689	509	123	44	13
1948	88	27	51	10	1	1978	678	516	115	38	9
1949	109	49	37	15	8	1979	777	593	141	39	3
1950	145	64	63	12	7	1980	802	558	199	41	4
1951	145	67	64	11	4	1981	591	353	181	50	7
1952	134	69	57	6	2	1982	960	728	178	48	6
1953	234	133	85	13	3	1983	939	675	212	46	6
1954	223	118	91	11	3	1984	891	636	201	49	4
						1985	947	667	226	46	8

Table 2.13—Regeneration[1] in the South Central region, by ownership and State, 1925–85—Continued

Thousand acres

						Alabama					
Year[2]	Total	Industry[3]	Other private	Federal	Other public	Year[2]	Total	Industry[3]	Other private	Federal	Other public
1925	([5])	([5])	([5])	([5])	([5])	1955	38	19	18	1	([4])
1926	([5])	([5])	([5])	([5])	([5])	1956	51	24	25	1	([4])
1927	([5])	([5])	([5])	([5])	([5])	1957	73	25	47	1	([4])
1928	([4])	([5])	([4])	([5])	([4])	1958	114	29	83	2	([4])
1929	([4])	([5])	([4])	([5])	([4])	1959	215	59	152	3	([4])
1930	([4])	([4])	([4])	([5])	([5])	1960	186	58	124	4	([4])
1931	([4])	([5])	([4])	([5])	([5])	1961	136	62	68	5	1
1932	([4])	([5])	([4])	([5])	([4])	1962	104	59	37	7	1
1933	([5])	([5])	([5])	([5])	([5])	1963	87	50	26	10	1
1934	([4])	([4])	([4])	([5])	([4])	1964	78	44	23	9	2
1935	2	1	1	([5])	1	1965	72	45	19	8	([4])
1936	4	1	2	([5])	1	1966	77	42	26	8	([4])
1937	6	([4])	2	4	([4])	1967	98	51	38	9	([4])
1938	14	2	5	8	([5])	1968	116	70	37	9	1
1939	16	3	5	8	([5])	1969	137	103	23	10	1
1940	15	2	5	8	([4])	1970	145	111	24	10	([4])
1941	23	1	9	12	([4])	1971	161	125	23	13	1
1942	6	([4])	([5])	5	([5])	1972	142	102	29	10	1
1943	1	([4])	([5])	1	([5])	1973	163	123	30	9	1
1944	([4])	([4])	([5])	([5])	([5])	1974	121	93	19	8	1
1945	2	1	2	([4])	([4])	1975	139	99	25	8	7
1946	3	1	1	1	([4])	1976	135	98	22	7	8
1947	4	1	2	1	([4])	1977	148	105	29	8	5
1948	10	3	5	2	([4])	1978	131	94	28	7	2
1949	22	8	7	2	([4])	1979	169	114	48	6	([5])
1950	21	7	7	4	3	1980	134	69	60	5	([4])
1951	19	6	9	4	([4])	1981	164	101	60	3	([5])
1952	17	8	8	1	([4])	1982	207	138	66	4	([5])
1953	41	20	19	2	([4])	1983	220	141	75	4	1
1954	35	17	15	2	([4])	1984	212	150	57	5	([4])
						1985	224	155	65	3	([4])

Table 2.13—Regeneration[1] in the South Central region, by ownership and State, 1925–85—Continued

Thousand acres

Arkansas											
Year[2]	Total	Industry[3]	Other private	Federal	Other public	Year[2]	Total	Industry[3]	Other private	Federal	Other public
1925	1	([5])	1	1	([5])	1955	15	10	4	1	([4])
1926	([5])	([5])	([5])	([5])	([5])	1956	16	8	8	([4])	([5])
1927	([5])	([5])	([5])	([5])	([5])	1957	20	11	9	([4])	([4])
1928	([5])	([5])	([5])	([5])	([5])	1958	37	11	26	([4])	([4])
1929	([5])	([5])	([5])	([5])	([5])	1959	81	16	62	3	([4])
1930	([4])	([5])	([5])	([4])	([5])	1960	73	15	51	7	([4])
1931	([4])	([5])	([5])	([4])	([5])	1961	27	9	13	5	([4])
1932	1	([5])	([4])	1	([5])	1962	32	10	11	11	([4])
1933	([5])	([5])	([5])	([5])	([5])	1963	28	10	7	10	([4])
1934	4	([5])	([5])	4	([5])	1964	19	7	5	7	([4])
1935	1	([5])	([4])	1	([5])	1965	23	12	8	4	([4])
1936	8	([4])	4	5	([5])	1966	22	8	10	4	([4])
1937	3	([4])	2	1	([5])	1967	19	7	5	8	([4])
1938	6	1	3	2	([5])	1968	24	9	6	9	([4])
1939	4	1	3	1	([4])	1969	19	8	([4])	10	([4])
1940	5	([4])	4	1	([4])	1970	40	23	7	10	([4])
1941	4	1	1	1	([4])	1971	38	22	4	13	([4])
1942	2	1	1	([4])	([5])	1972	43	24	4	16	([4])
1943	([4])	([4])	([4])	([5])	([5])	1973	64	43	6	15	([4])
1944	([4])	([4])	([4])	([5])	([4])	1974	78	57	5	16	([4])
1945	2	([4])	1	([4])	([5])	1975	112	86	7	19	([4])
1946	2	([5])	2	([4])	([5])	1976	120	90	10	20	([4])
1947	4	([5])	3	1	([5])	1977	108	80	14	14	([4])
1948	9	([4])	8	1	([5])	1978	80	56	9	15	([4])
1949	13	5	6	1	1	1979	108	82	14	12	([4])
1950	15	9	4	1	2	1980	148	106	27	15	([4])
1951	14	10	3	1	1	1981	152	109	19	24	([4])
1952	20	16	3	([4])	([4])	1982	155	111	22	22	1
1953	23	17	5	1	([4])	1983	148	109	20	19	([4])
1954	13	9	3	1	([4])	1984	127	92	16	19	([4])
						1985	132	91	23	18	([4])

Table 2.13—Regeneration[1] in the South Central region, by ownership and State, 1925–85—Continued

Thousand acres

Louisiana											
Year[2]	Total	Industry[3]	Other private	Federal	Other public	Year[2]	Total	Industry[3]	Other private	Federal	Other public
1925	16	15	1	([5])	([5])	1955	47	27	18	1	([4])
1926	7	7	([5])	([5])	([5])	1956	62	36	22	2	1
1927	3	3	([4])	([5])	([4])	1957	76	39	35	2	([5])
1928	9	9	([4])	([5])	([4])	1958	95	51	39	4	([5])
1929	11	10	([4])	([4])	([4])	1959	201	111	82	8	([5])
1930	7	6	([4])	([5])	([4])	1960	191	112	69	10	([4])
1931	2	2	([4])	([4])	([4])	1961	123	84	30	8	1
1932	2	2	([4])	([5])	([4])	1962	90	63	19	8	([5])
1933	([5])	([5])	([5])	([5])	([5])	1963	74	56	11	8	([4])
1934	1	([4])	([4])	([4])	([4])	1964	59	46	7	6	([4])
1935	5	([4])	([4])	5	([4])	1965	50	40	7	3	([4])
1936	24	([4])	([4])	23	([4])	1966	42	33	6	3	([4])
1937	24	1	([4])	22	1	1967	50	39	6	4	([4])
1938	23	([4])	7	14	1	1968	64	54	7	2	([4])
1939	21	3	4	13	1	1969	61	50	9	2	([5])
1940	18	1	5	12	([4])	1970	68	60	5	2	([4])
1941	19	3	4	12	([4])	1971	99	82	11	3	3
1942	11	5	([5])	6	([5])	1972	89	75	10	4	1
1943	5	5	([5])	([5])	([5])	1973	71	56	11	4	([4])
1944	1	1	([4])	([5])	([5])	1974	79	68	5	6	([4])
1945	4	3	1	([5])	([4])	1975	77	66	7	4	1
1946	5	2	1	2	([5])	1976	82	71	5	5	1
1947	5	1	4	1	([4])	1977	93	75	12	6	1
1948	15	9	6	1	([4])	1978	109	96	8	5	([5])
1949	32	24	5	2	1	1979	125	105	14	6	([5])
1950	46	34	10	1	1	1980	144	123	17	4	([5])
1951	53	33	19	([5])	1	1981	26	5	16	5	([5])
1952	37	25	10	([4])	1	1982	153	137	11	5	([5])
1953	79	63	14	1	1	1983	133	116	12	6	([5])
1954	68	50	16	1	2	1984	146	130	13	4	([5])
						1985	142	121	16	5	([4])

Table 2.13—Regeneration[1] in the South Central region, by ownership and State, 1925–85—Continued

Thousand acres

			Mississippi								
Year[2]	Total	Industry[3]	Other private	Federal	Other public	Year[2]	Total	Industry[3]	Other private	Federal	Other public
1925	([4])	([4])	([4])	([5])	([5])	1955	54	14	38	2	([4])
1926	([5])	([5])	([5])	([5])	([5])	1956	85	21	61	3	([4])
1927	([5])	([5])	([5])	([5])	([5])	1957	79	12	60	6	([4])
1928	([5])	([5])	([5])	([5])	([5])	1958	133	32	96	4	1
1929	([5])	([5])	([5])	([5])	([5])	1959	168	34	127	6	1
1930	1	1	([4])	([5])	([5])	1960	171	45	115	8	2
1931	1	1	([4])	([5])	([5])	1961	154	44	97	11	2
1932	([4])	([5])	([4])	([5])	([5])	1962	111	19	70	19	3
1933	([4])	([5])	([5])	([5])	([4])	1963	88	28	47	13	([4])
1934	([4])	([4])	([4])	([4])	([4])	1964	79	30	41	8	1
1935	10	([4])	4	5	1	1965	77	29	38	10	([4])
1936	24	([4])	12	3	([4])	1966	74	21	41	11	1
1937	22	([4])	21	8	1	1967	67	17	40	10	([4])
1938	23	([4])	41	9	([4])	1968	68	23	34	10	1
1939	18	([4])	41	3	([4])	1969	77	45	20	9	3
1940	19	([4])	51	4	([4])	1970	103	56	37	8	2
1941	37	([4])	15	21	1	1971	107	63	29	13	2
1942	14	1	4	9	([5])	1972	111	65	30	14	2
1943	1	([4])	([5])	([4])	([5])	1973	115	73	30	11	2
1944	([4])	([4])	([5])	([5])	([5])	1974	116	78	23	11	3
1945	5	1	4	([4])	([4])	1975	141	101	27	9	4
1946	6	1	5	([4])	([4])	1976	117	72	32	11	2
1947	4	1	3	1	([4])	1977	137	83	42	8	4
1948	21	5	15	1	([4])	1978	147	92	45	7	2
1949	11	3	4	4	([4])	1979	159	108	42	6	2
1950	32	4	24	4	([4])	1980	155	86	59	7	2
1951	30	6	19	4	([4])	1981	150	90	49	8	4
1952	34	10	21	3	([4])	1982	181	122	46	9	5
1953	64	24	33	6	([4])	1983	197	114	70	8	5
1954	65	22	37	6	([4])	1984	204	109	78	13	3
						1985	212	101	92	12	6

Table 2.13—Regeneration[1] in the South Central region, by ownership and State, 1925–85—Continued

Thousand acres

Tennessee

Year[2]	Total	Industry[3]	Other private	Federal	Other public	Year[2]	Total	Industry[3]	Other private	Federal	Other public
1925	([4])	([5])	([4])	([5])	([5])	1955	23	2	16	4	1
1926	([5])	([5])	([5])	([5])	([5])	1956	32	11	16	3	1
1927	([5])	([5])	([5])	([5])	([5])	1957	38	15	22	1	([4])
1928	([5])	([5])	([5])	([5])	([5])	1958	62	19	40	2	1
1929	([4])	([5])	([4])	([4])	([4])	1959	64	12	49	2	1
1930	([4])	([5])	([4])	([4])	([4])	1960	49	13	32	2	1
1931	1	([4])	1	([5])	([4])	1961	46	18	26	2	1
1932	1	([5])	1	([4])	([4])	1962	43	21	18	3	1
1933	1	([5])	1	([5])	([5])	1963	38	10	20	6	1
1934	7	([4])	3	4	([4])	1964	35	14	15	5	([4])
1935	10	([4])	5	5	([4])	1965	24	3	15	6	1
1936	14	([4])	6	3	5	1966	22	3	14	3	1
1937	16	([4])	12	2	1	1967	21	6	13	1	2
1938	23	([4])	14	8	1	1968	20	6	10	2	1
1939	20	([4])	12	7	1	1969	17	7	6	2	1
1940	21	([4])	16	4	1	1970	18	9	7	2	1
1941	21	([4])	16	4	1	1971	20	11	7	2	1
1942	9	([5])	8	([4])	1	1972	19	10	7	2	1
1943	3	([5])	2	1	([4])	1973	19	6	9	2	2
1944	1	([5])	1	([4])	([4])	1974	19	6	9	2	2
1945	2	([4])	1	([4])	([4])	1975	14	5	5	3	1
1946	2	([5])	1	([4])	([4])	1976	18	8	6	3	1
1947	4	([4])	3	([4])	([4])	1977	34	23	7	2	2
1948	10	([4])	7	3	([4])	1978	25	12	6	3	4
1949	12	([4])	8	3	([4])	1979	17	12	2	2	([4])
1950	10	([4])	9	1	([4])	1980	40	26	9	3	1
1951	7	([5])	4	1	1	1981	21	13	3	2	3
1952	10	1	8	1	([4])	1982	25	20	3	2	([4])
1953	11	3	7	1	1	1983	26	20	3	2	([4])
1954	13	3	7	1	1	1984	28	20	5	3	([4])
						1985	29	23	3	2	1

Table 2.13—Regeneration[1] in the South Central region, by ownership and State, 1925–85—Continued

Thousand acres

Texas											
Year[2]	Total	Industry[3]	Other private	Federal	Other public	Year[2]	Total	Industry[3]	Other private	Federal	Other public
1925	4	(4)	4	(5)	(5)	1955	23	11	12	(4)	(4)
1926	(5)	(5)	(5)	(5)	(5)	1956	21	6	14	1	(4)
1927	(5)	(5)	(5)	(5)	(5)	1957	26	8	15	3	(4)
1928	(5)	(5)	(5)	(5)	(5)	1958	44	6	38	1	(4)
1929	(5)	(5)	(5)	(5)	(5)	1959	95	28	64	2	(4)
1930	(4)	(4)	(4)	(5)	(4)	1960	69	30	36	2	(4)
1931	(5)	(5)	(5)	(5)	(5)	1961	55	37	16	2	(4)
1932	(4)	(4)	(4)	(5)	(4)	1962	30	15	11	3	(4)
1933	(5)	(5)	(5)	(5)	(5)	1963	33	24	7	2	(4)
1934	(5)	(5)	(5)	(5)	(5)	1964	34	25	6	2	(4)
1935	(4)	(5)	(4)	(5)	(4)	1965	19	10	6	2	1
1936	4	(5)	(4)	4	(5)	1966	17	11	3	3	(4)
1937	13	(5)	(4)	12	(4)	1967	29	22	3	4	(4)
1938	22	(5)	12	10	(5)	1968	26	18	3	5	(4)
1939	14	(5)	7	7	(5)	1969	42	30	6	5	(4)
1940	16	(5)	8	8	(4)	1970	48	39	4	5	(4)
1941	9	1	2	6	(4)	1971	55	42	4	8	1
1942	8	3	3	2	(4)	1972	65	49	6	8	1
1943	2	1	1	(4)	(4)	1973	97	81	6	9	1
1944	2	1	1	(5)	(4)	1974	68	56	4	6	1
1945	4	2	2	(5)	(4)	1975	96	78	11	7	1
1946	2	(4)	2	(5)	(4)	1976	79	64	11	5	(4)
1947	3	1	2	(4)	(4)	1977	128	106	17	4	1
1948	18	9	9	(4)	(4)	1978	135	120	15	(4)	(4)
1949	17	9	6	1	2	1979	151	130	15	4	1
1950	18	10	8	(4)	(4)	1980	138	113	20	5	(5)
1951	20	11	8	(5)	1	1981	34	(5)	29	5	(5)
1952	11	6	5	(4)	(4)	1982	179	150	26	3	(4)
1953	12	5	6	1	(4)	1983	157	124	28	4	(4)
1954	26	15	10	(4)	(4)	1984	136	105	28	3	(4)
						1985	175	149	24	3	(5)

Table 2.13—Regeneration[1] in the South Central region, by ownership and State, 1925–85—Continued

Thousand acres

					Oklahoma						
Year[2]	Total	Industry[3]	Other private	Federal	Other public	Year[2]	Total	Industry[3]	Other private	Federal	Other public
1925	3	([5])	3	([4])	([5])	1955	3	([4])	2	([4])	([4])
1926	([5])	([5])	([5])	([5])	([5])	1956	2	([4])	1	([4])	([4])
1927	([5])	([5])	([5])	([5])	([5])	1957	4	([4])	3	([4])	([4])
1928	([4])	([5])	([4])	([4])	([5])	1958	5	1	4	([4])	([4])
1929	([4])	([5])	([4])	([4])	([5])	1959	6	1	6	([4])	([4])
1930	([4])	([5])	([4])	([4])	([4])	1960	5	1	4	([4])	([4])
1931	([4])	([5])	([4])	([4])	([5])	1961	4	([4])	3	([4])	([4])
1932	([4])	([5])	([4])	([4])	([5])	1962	4	([4])	2	2	([4])
1933	([5])	([5])	([5])	([5])	([5])	1963	10	([4])	9	1	1
1934	([4])	([5])	([4])	([4])	([5])	1964	5	([4])	1	3	([4])
1935	1	([5])	1	([5])	([4])	1965	4	([4])	1	2	([4])
1936	2	([4])	2	([5])	([4])	1966	2	([4])	1	1	([4])
1937	1	([4])	([4])	([4])	([4])	1967	2	([4])	([4])	1	([4])
1938	18	([5])	17	([4])	([4])	1968	2	([4])	1	1	([4])
1939	8	([5])	8	([4])	([4])	1969	1	([4])	1	([4])	([4])
1940	9	([4])	8	1	([4])	1970	2	([4])	1	([4])	([4])
1941	5	([4])	5	([4])	([4])	1971	3	1	1	1	([4])
1942	([5])	([5])	([5])	([5])	([5])	1972	7	3	2	2	([4])
1943	([5])	([5])	([5])	([5])	([5])	1973	15	11	2	2	([4])
1944	([5])	([5])	([5])	([5])	([5])	1974	39	36	1	2	([5])
1945	5	([5])	5	([4])	([4])	1975	46	41	2	3	([5])
1946	1	([5])	1	([4])	([4])	1976	49	44	2	3	([5])
1947	2	([4])	2	([4])	([4])	1977	42	36	3	2	([5])
1948	5	1	2	2	([4])	1978	51	46	3	2	([5])
1949	3	([4])	1	2	([4])	1979	49	41	5	3	([5])
1950	3	1	1	([4])	([4])	1980	44	35	7	2	([5])
1951	3	1	2	1	([4])	1981	43	35	6	2	([4])
1952	4	3	1	([5])	([4])	1982	60	51	6	2	([4])
1953	3	1	1	1	([4])	1983	59	51	5	3	([4])
1954	3	1	2	([5])	([4])	1984	37	30	4	2	([4])
						1985	33	28	3	2	([5])

[1] Includes planting and direct seeding. Excludes site preparation for natural regeneration.

[2] Fiscal year.

[3] Forest industry and mining, railroad, and utility companies.

[4] Less than 500 acres.

[5] None reported.

Note: Data reported in the sources listed below vary considerably in quality and accuracy. Therefore, the data shown in this table may be incomplete. Data may not add to total because of rounding.

Sources: See footnote on appendix table 2.11.

Table 2.14—Federal expenditures for regeneration and stand improvement[1] and acres treated on other private ownerships in the South, by region, 1936–85

	South							
	Expenditures							
	Total		Forestry Incentives Program		Agricultural Conservation Program		Acres treated	
Year[2]	Current dollars	1982 dollars[3]	Current dollars	1982 dollars[3]	Current dollars	1982 dollars[3]	Regeneration	Stand improvement
	Thousands							
1936	([4])	—	([5])	—	([4])	—	17	([6])
1937	([4])	—	([5])	—	([4])	—	13	2
1938	([4])	—	([5])	—	([4])	—	29	3
1939	([4])	—	([5])	—	([4])	—	35	3
1940	([4])	—	([5])	—	([4])	—	76	8
1941	([4])	—	([5])	—	([4])	—	32	6
1942	([4])	—	([5])	—	([4])	—	19	4
1943	([4])	—	([5])	—	([4])	—	10	2
1944	([5])	—	([5])	—	([5])	—	([5])	([5])
1945	14	119	([5])	—	14	119	3	([7])
1946	54	450	([5])	—	54	450	15	35
1947	33	223	([5])	—	33	223	9	52
1948	89	546	([5])	—	89	546	27	18
1949	238	1,352	([5])	—	238	1,352	53	20
1950	355	2,178	([5])	—	355	2,178	69	23
1951	313	1,739	([5])	—	313	1,739	53	13
1952	324	1,679	([5])	—	324	1,679	50	15
1953	257	1,311	([5])	—	257	1,311	42	20
1954	447	2,269	([5])	—	447	2,269	80	59
1955	625	3,034	([5])	—	625	3,034	106	102
1956	1,662	7,730	([5])	—	1,662	7,730	[8]173	161
1957	2,482	11,031	([5])	—	2,482	11,031	[8]428	173
1958	3,309	13,674	([5])	—	3,309	13,674	[8]591	250
1959	3,694	15,016	([5])	—	3,694	15,016	[8]1,010	232
1960	3,380	13,684	([5])	—	3,380	13,684	[8]778	162
1961	3,086	12,344	([5])	—	3,086	12,344	[8]354	143
1962	2,305	8,900	([5])	—	2,305	8,900	[8]179	107
1963	1,752	6,611	([5])	—	1,752	6,611	[8]126	82
1964	1,609	5,915	([5])	—	1,609	5,915	118	63
1965	1,517	5,399	([5])	—	1,517	5,399	108	110
1966	1,459	4,963	([5])	—	1,459	4,963	104	89
1967	1,623	5,321	([5])	—	1,623	5,321	112	123
1968	1,218	3,771	([5])	—	1,218	3,771	88	87
1969	1,110	3,284	([5])	—	1,110	3,284	75	77

Table 2.14—Federal expenditures for regeneration and stand improvement[1] and acres treated on other private ownerships in the South, by region, 1936–85—Continued

	South							
	Expenditures							
	Total		Forestry Incentives Program		Agricultural Conservation Program		Acres treated	
Year[2]	Current dollars	1982 dollars[3]	Current dollars	1982 dollars[3]	Current dollars	1982 dollars[3]	Regeneration	Stand improvement
	Thousands							
1970	1,211	3,291	(5)	—	1,211	3,291	81	57
1971	1,903	4,781	(5)	—	1,903	4,781	87	65
1972	3,262	6,970	(5)	—	3,262	6,970	127	104
1973	1,106	2,262	(5)	—	1,106	2,262	30	24
1974	17,009	13,150	6,109	11,461	901	1,690	157	74
1975	804	1,327	(9)		804	1,327	148	17
1976	5,347	8,316	5,158	8,022	189	294	89	79
1977	7,850	11,360	7,255	10,499	596	863	152	70
1978	9,513	13,140	8,974	12,395	539	744	167	77
1979	11,514	14,762	10,829	13,883	686	879	209	54
1980	13,749	15,913	12,442	14,400	1,307	1,513	226	48
1981	15,056	15,966	13,562	14,382	1,494	1,584	217	49
1982	10,834	10,834	9,226	9,226	1,608	1,608	172	35
1983	9,662	9,538	7,662	7,564	2,000	1,974	173	26
1984	7,504	7,140	6,016	5,724	1,488	1,416	155	17
1985[10]	10,128	9,387	7,536	6,985	2,592	2,402	217	14

Table 2.14—Federal expenditures for regeneration and stand improvement[1] and acres treated on other private ownerships in the South, by region, 1936–85—Continued

	Southeast							
	Expenditures						Acres treated	
	Total		Forestry Incentives Program		Agricultural Conservation Program			
Year[2]	Current dollars	1982 dollars[3]	Current dollars	1982 dollars[3]	Current dollars	1982 dollars[3]	Regeneration	Stand improvement
	Thousands							
1936	([4])	—	([5])	—	([4])	—	7	([6])
1937	([4])	—	([5])	—	([4])	—	8	1
1938	([4])	—	([5])	—	([4])	—	20	3
1939	([4])	—	([5])	—	([4])	—	26	2
1940	([4])	—	([5])	—	([4])	—	48	8
1941	([4])	—	([5])	—	([4])	—	17	4
1942	([4])	—	([5])	—	([4])	—	9	2
1943	([4])	—	([5])	—	([4])	—	8	2
1944	([5])	—	([5])	—	([5])	—	([5])	([5])
1945	6	51	([5])	—	6	51	1	([6])
1946	44	367	([5])	—	44	367	13	34
1947	25	169	([5])	—	25	169	7	45
1948	57	350	([5])	—	57	350	21	17
1949	120	682	([5])	—	120	682	35	13
1950	139	853	([5])	—	139	853	41	11
1951	112	622	([5])	—	112	622	22	2
1952	86	446	([5])	—	864	46	14	3
1953	112	571	([5])	—	112	571	19	4
1954	170	863	([5])	—	170	863	35	4
1955	268	1,301	([5])	—	268	1,301	43	11
1956	536	2,493	([5])	—	536	2,493	[8]93	17
1957	936	4,160	([5])	—	936	4,160	[8]255	30
1958	1,268	5,240	([5])	—	1,268	5,240	[8]302	40
1959	1,564	6,358	([5])	—	1,564	6,358	[8]598	41
1960	1,569	6,352	([5])	—	1,569	6,352	[8]494	35
1961	1,589	6,356	([5])	—	1,589	6,356	[8]220	35
1962	1,267	4,892	([5])	—	1,267	4,892	[8]98	27
1963	1,060	4,000	([5])	—	1,060	4,000	[8]76	25
1964	1,026	3,772	([5])	—	1,026	3,772	75	21
1965	945	3,363	([5])	—	945	3,363	69	69
1966	937	3,187	([5])	—	937	3,187	66	54
1967	1,083	3,551	([5])	—	1,083	3,551	75	88
1968	697	2,158	([5])	—	697	2,158	55	60
1969	706	2,089	([5])	—	706	2,089	50	54

Table 2.14—Federal expenditures for regeneration and stand improvement[1] and acres treated on other private ownerships in the South, by region, 1936–85—Continued

Year[2]	Southeast: Expenditures: Total: Current dollars	Total: 1982 dollars[3]	Forestry Incentives Program: Current dollars	Forestry Incentives Program: 1982 dollars[3]	Agricultural Conservation Program: Current dollars	Agricultural Conservation Program: 1982 dollars[3]	Acres treated: Regeneration	Acres treated: Stand improvement
	Thousands							
1970	745	2,024	([5])	—	745	2,024	49	35
1971	1,020	2,563	([5])	—	1,020	2,563	56	29
1972	1,599	3,417	([5])	—	1,599	3,417	76	44
1973	708	1,448	([5])	—	708	1,448	22	15
1974	4,206	7,891	3,595	6,746	610	1,145	99	34
1975	395	652	([9])	—	395	652	88	14
1976	2,812	4,373	2,695	4,191	116	180	56	27
1977	3,958	5,728	3,576	5,175	382	553	83	20
1978	5,008	6,917	4,641	6,410	367	507	98	21
1979	5,895	7,558	5,415	6,942	480	615	109	19
1980	6,787	7,855	6,073	7,029	714	826	118	13
1981	7,969	8,451	6,968	7,389	1,002	1,063	126	20
1982	6,144	6,144	5,147	5,147	997	997	98	12
1983	5,182	5,115	3,934	3,884	1,248	1,232	92	9
1984	4,281	4,073	3,232	3,057	1,050	999	85	6
1985[10]	5,739	5,319	4,097	3,797	1,643	1,522	119	6

Table 2.14—Federal expenditures for regeneration and stand improvement[1] and acres treated on other private ownerships in the South, by region, 1936–85—Continued

	Central							
	Expenditures							
	Total		Forestry Incentives Program		Agricultural Conservation Program		Acres treated	
Year[2]	Current dollars	1982 dollars[3]	Current dollars	1982 dollars[3]	Current dollars	1982 dollars[3]	Regeneration	Stand improvement
	Thousands							
1936	(4)	—	(5)	—	(4)	—	9	(6)
1937	(4)	—	(5)	—	(4)	—	5	(7)
1938	(4)	—	(5)	—	(4)	—	9	(7)
1939	(4)	—	(5)	—	(4)	—	9	1
1940	(4)	—	(5)	—	(4)	—	28	(7)
1941	(4)	—	(5)	—	(4)	—	16	1
1942	(4)	—	(5)	—	(4)	—	10	3
1943	(4)	—	(5)	—	(4)	—	2	(7)
1944	(5)	—	(5)	—	(5)	—	(5)	(5)
1945	8	68	(5)	—	8	68	1	(7)
1946	11	92	(5)	—	11	92	2	1
1947	8	54	(5)	—	8	54	1	7
1948	32	196	(5)	—	32	196	6	1
1949	118	670	(5)	—	118	670	18	8
1950	216	1,325	(5)	—	216	1,325	28	12
1951	201	1,117	(5)	—	201	1,117	31	11
1952	238	1,233	(5)	—	238	1,233	36	12
1953	146	745	(5)	—	146	745	23	16
1954	277	1,406	(5)	—	277	1,406	46	55
1955	358	1,738	(5)	—	358	1,738	63	91
1956	1,125	5,233	(5)	—	1,125	5,233	[8]79	143
1957	1,545	6,867	(5)	—	1,545	6,867	[8]174	143
1958	2,041	8,434	(5)	—	2,041	8,434	[8]288	209
1959	2,130	8,659	(5)	—	2,130	8,659	[8]412	191
1960	1,811	7,332	(5)	—	1,811	7,332	[8]284	127
1961	1,497	5,988	(5)	—	1,497	5,988	[8]134	108
1962	1,038	4,008	(5)	—	1,038	4,008	[8]81	81
1963	692	2,611	(5)	—	692	2,611	[8]50	57
1964	583	2,143	(5)	—	583	2,143	43	42
1965	572	2,036	(5)	—	572	2,036	39	40
1966	522	1,776	(5)	—	522	1,776	37	35
1967	539	1,767	(5)	—	539	1,767	36	35
1968	522	1,616	(5)	—	522	1,616	34	27
1969	404	1,195	(5)	—	404	1,195	25	23
1970	465	1,264	(5)	—	465	1,264	31	22
1971	883	2,219	(5)	—	883	2,219	31	36
1972	1,663	3,553	(5)	—	1,663	3,553	51	61
1973	398	814	(5)	—	398	814	8	9
1974	2,803	5,259	2,513	4,715	290	544	58	40

Table 2.14—Federal expenditures for regeneration and stand improvement[1] and acres treated on other private ownerships in the South, by region, 1936–85—Continued

	South Central							
	Expenditures						Acres treated	
	Total		Forestry Incentives Program		Agricultural Conservation Program			
Year[2]	Current dollars	1982 dollars[3]	Current dollars	1982 dollars[3]	Current dollars	1982 dollars[3]	Regeneration	Stand improvement
	Thousands							
1975	409	675	([9])	—	409	675	59	3
1976	2,535	3,942	2,463	3,830	72	112	33	52
1977	3,893	5,634	3,679	5,324	214	310	69	50
1978	4,505	6,222	4,333	5,985	172	238	69	55
1979	5,619	7,204	5,413	6,940	206	264	100	35
1980	6,962	8,058	6,369	7,372	593	686	108	35
1981	7,087	7,515	6,594	6,993	493	523	91	29
1982	4,690	4,690	4,079	4,079	611	611	73	23
1983	4,480	4,423	3,728	3,680	752	742	82	16
1984	3,223	3,067	2,784	2,649	439	417	70	10
1985[10]	4,389	4,068	3,440	3,188	949	880	98	8

[1] Regeneration includes planting and direct seeding for all years and site preparation for natural regeneration from fiscal year 1982 forward; stand improvement includes intermediate stand treatments to increase timber growth or enhance timber quality. Federal cost-shares cover up to a maximum of 75 percent of the treatment costs under ACP or 65 percent under FIP. Federal cost-shares may be set below the maximum level at the option of individual State programs.

[2] Fiscal year.

[3] Converted to 1982 dollars by dividing the expenditures in current dollars by the implicit price deflators for gross national product for all Federal Government purchases of goods and services for 1945–71 and for nondefense Federal Government purchases of goods and services for 1972–85, as reported by the U.S.Department of Commerce, Bureau of Economic Analysis.

[4] Data not available.

[5] No program in that year.

[6] None reported.

[7] Less than 500 acres.

[8] Includes tree planting under the Soil Bank Program.

[9] FIP activities in 1975 included with 1976 FIP activities.

[10] Preliminary figures.

Note: Data may not add to totals because of rounding.

Table 2.15—Activities of State forestry agencies in the South, by region and State, fiscal year 1985

Activity	Unit of measure	**South**	**Southeast**	Virginia	North Carolina	South Carolina	Georgia	Florida
State-employed professional service foresters	Number of full-time equivalent positions	481	272	68	35	30	81	58
State expenditures for cooperative forest management	Thousand dollars	24,141	12,141	4,223	2,762	1,642	2,062	1,452
State nursery production								
Total production	Thousand seedlings	595,428	360,822	68,444	44,067	53,932	122,179	72,200
Genetically improved seedlings	Percent of total	63	71	22	51	85	98	75
Fire protection								
State expenditures	Thousand dollars	104,659	62,221	5,348	13,563	6,943	18,822	17,545
Acres protected	Thousand acres	230,112	104,471	18,519	19,540	12,031	27,279	27,102
Timberland burned	Thousand acres	880	555	12	100	105	71	267
Regeneration on nonindustrial private lands								
Federal cost-shares	Thousand dollars	9,890	5,653	632	614	1,160	1,805	1,442
	Acres	217,072	118,921	16,374	16,791	20,729	29,340	35,687
Non-Federal cost-shares	Thousand dollars	6,749	3,913	805	2,600	448	0	60
	Acres	138,230	74,151	22,569	39,488	7,355	0	4,739
Timber stand improvement on nonindustrial private lands								
Federal cost-shares	Thousand dollars	238	86	36	19	13	3	16
	Acres	13,880	6,356	1,582	763	1,923	127	1,961
Non-Federal cost-shares	Thousand dollars	508	443	409	23	11	0	0
	Acres	24,039	21,120	19,671	1,110	339	0	0

Table 2.15—Activities of State forestry agencies in the South, by region and State, fiscal year 1985—Continued

Activity	Unit of measure	**South Central**	Alabama	Mississippi	Tennessee	Arkansas	Louisiana	Texas	Oklahoma
State-employed professional service foresters	Number of full-time equivalent positions	209	45	52	17	23	25	31	16
State expenditures for cooperative forest management	Thousand dollars	12,000	3,600	1,324	859	1,746	883	2,953	635
State nursery production									
Total production	Thousand seedlings	234,606	60,000	68,400	10,500	14,095	63,000	15,157	3,454
Genetically improved seedlings	Percent of total	51	100	0	11	67	56	69	64
Fire protection									
State expenditures	Thousand dollars	42,438	6,300	6,707	6,680	7,000	9,158	3,813	2,780
Acres protected	Thousand acres	125,641	25,029	19,858	12,879	19,728	20,939	22,123	5,085
Timberland burned	Thousand acres	325	135	64	39	15	46	11	15
Regeneration on nonindustrial private lands									
Federal cost-shares	Thousand dollars	4,237	1,454	1,139	116	629	540	298	61
	Acres	98,151	29,257	29,494	2,115	15,492	11,439	9,018	1,336
Non-Federal cost-shares	Thousand dollars	2,836	0	2,420	0	0	0	416	0
	Acres	64,079	0	55,546	0	0	0	8,533	0
Timber stand improvement on nonindustrial private lands									
Federal cost-shares	Thousand dollars	151	20	10	0	42	36	31	12
	Acres	7,524	2,030	437	0	1,710	1,386	1,489	472
Non-Federal cost-shares	Thousand dollars	65	0	58	0	0	0	7	0
	Acres	2,919	0	2,586	0	0	0	333	0

Table 2.16—Federal funds allocated to the Southern Forest Experiment Station for forest research, by functional activity, 1922–86

	Total allocation		Functional activity: Fire		Insect		Disease		Renewable resources evaluation		Renewable resources economics		Timber management		Forest products utilization		Forest engineering		Other[3]	
Year[1]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]
									Thousands											
1922	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1923	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1924	16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1925	38	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1926	37	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1927	38	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1928	41	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1929	45	556	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1930	82	1,071	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1931	134	1,712	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1932	181	2,443	—	—	—	—	—	—	62	831	31	415	79	1,069	—	—	—	—	10	128
1933	170	2,121	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1934	(4)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1935	154	1,716	—	—	—	—	—	—	38	418	20	219	60	667	—	—	—	—	37	412
1936	182	1,914	—	—	—	—	—	—	92	968	21	217	65	683	—	—	—	—	4	46
1937	166	1,697	—	—	—	—	—	—	72	735	21	211	69	708	—	—	—	—	4	44
1938	168	1,662	2	15	—	—	—	—	72	713	21	204	69	687	—	—	—	—	4	43
1939[5]	168	1,730	2	15	—	—	—	—	72	742	21	213	69	715	—	—	—	—	4	45
1940	180	1,859	2	23	—	—	—	—	55	567	28	285	66	679	—	—	—	—	30	305
1941	284	2,555	2	20	—	—	—	—	42	378	21	191	59	530	—	—	—	—	159	1,436
1942	128	1,003	2	16	—	—	—	—	42	328	21	165	59	460	—	—	—	—	4	34
1943	(4)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1944	144	1,163	5	40	—	—	—	—	30	242	17	137	50	403	—	—	—	—	42	341
1945	(4)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1946	433	3,607	—	—	—	—	—	—	53	438	2	15	312	2,601	33	273	—	—	34	280
1947	640	4,328	—	—	—	—	—	—	139	942	18	121	242	1,632	33	221	—	—	209	1,411
1948[6]	595	3,652	—	—	—	—	—	—	136	835	—	—	293	1,797	26	160	—	—	140	860
1949[6]	622	3,537	—	—	—	—	—	—	135	764	—	—	309	1,758	22	122	—	—	157	893
1950[6]	580	3,557	—	—	—	—	—	—	140	856	—	—	306	1,878	22	135	—	—	112	689
1951	579	3,215	8	45	—	—	—	—	115	639	24	133	297	1,649	22	124	—	—	112	624
1952	592	3,066	8	42	—	—	—	—	103	532	18	91	291	1,506	20	105	—	—	152	789
1953[6]	558	2,848	—	—	—	—	—	—	118	600	—	—	327	1,668	22	110	—	—	92	471
1954	508	2,576	9	43	—	—	—	—	105	533	13	64	299	1,520	22	111	—	—	60	306
1955	622	3,021	9	41	31	151	33	159	105	510	12	58	342	1,659	22	107	—	—	69	335
1956	915	4,255	9	40	50	231	33	152	105	488	12	56	545	2,533	22	102	—	—	140	653
1957	1,226	5,448	37	163	65	289	52	231	136	604	42	187	686	3,049	23	103	—	—	185	821
1958	1,380	5,702	38	158	68	281	54	224	177	730	45	186	767	3,171	27	112	—	—	203	841
1959	1,609	6,539	38	156	68	277	54	220	177	718	45	183	985	4,006	27	110	—	—	214	870
1960	1,707	6,911	40	164	73	294	58	234	186	752	48	194	1,045	4,230	29	116	—	—	229	[illegible]
1961	2,230	8,918	51	203	88	353	73	293	187	749	48	193	1,161	4,645	35	139	—	—	586	[illegible]
1962	2,475	9,554	78	302	148	571	153	589	220	849	81	312	1,349	5,208	77	298	—	—	369	1,424
1963	2,547	9,612	78	295	169	638	167	629	218	822	81	305	1,340	5,056	87	329	40	151	368	1,387
1964	2,838	10,432	83	304	205	754	178	655	232	852	86	317	1,539	5,657	94	346	43	158	378	1,389

Table 2.16—Federal funds allocated to the Southern Forest Experiment Station for forest research, by functional activity, 1922–86—Continued

	Total allocation		Functional activity: Fire		Insect		Disease		Renewable resources evaluation		Renewable resources economics		Timber management		Forest products utilization		Forest engineering		Other[3]	
Year[1]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]
1965	3,399	12,095	84	299	425	1,514	216	767	265	942	88	312	1,584	5,637	239	850	72	257	426	1,517
1966	3,789	12,888	86	291	432	1,471	221	750	270	920	90	305	1,650	5,612	315	1,070	73	248	653	2,220
1967	4,219	13,833	88	288	472	1,549	254	831	296	971	99	325	1,684	5,521	323	1,060	75	245	929	3,045
1968	4,474	13,852	90	278	601	1,861	268	830	329	1,017	140	434	1,787	5,532	330	1,023	97	299	833	2,578
1969	4,339	12,838	92	272	621	1,838	277	819	340	1,005	145	428	1,847	5,466	343	1,014	99	294	576	1,703
1970	4,900	13,315	112	304	640	1,738	285	775	381	1,036	151	411	1,924	5,229	351	954	102	277	954	2,592
1971	5,089	12,786	116	291	684	1,718	331	832	490	1,232	207	521	2,081	5,229	371	932	174	437	635	1,595
1972	5,975	12,767	123	263	750	1,602	511	1,091	536	1,146	228	487	2,248	4,804	577	1,232	186	396	817	1,745
1973	6,791	13,887	124	253	888	1,816	476	974	538	1,100	229	468	2,771	5,666	578	1,182	186	381	1,001	2,047
1974	6,301	11,822	124	232	1,400	2,627	([7])	—	538	1,010	229	429	2,348	4,405	578	1,085	186	349	898	1,686
1975	6,860	11,320	134	221	1,521	2,510	([7])	—	588	971	252	416	2,570	4,241	623	1,028	198	326	974	1,607
1976	7,629	11,865	138	215	2,063	3,209	([7])	—	710	1,105	265	412	2,672	4,155	665	1,033	194	301	922	1,435
1977	8,544	12,364	146	211	2,262	3,274	([7])	—	1,059	1,533	285	412	2,872	4,156	695	1,005	205	297	1,020	1,476
1978	10,357	14,305	153	211	2,371	3,275	([7])	—	1,445	1,996	301	416	3,556	4,912	723	999	354	489	1,453	2,007
1979	11,272	14,451	159	204	2,532	3,246	([7])	—	1,486	1,905	313	401	4,211	5,399	773	991	363	465	1,435	1,840
1980	11,616	13,444	163	189	2,650	3,067	([7])	—	1,511	1,749	321	372	4,361	5,047	860	995	370	428	1,380	1,597
1981	14,209	15,068	174	185	3,607	3,825	([7])	—	1,716	1,820	389	413	5,196	5,510	986	1,046	504	534	1,637	1,736
1982	13,321	13,321	155	155	3,516	3,516	([7])	—	1,572	1,572	394	394	4,621	4,621	1,069	1,069	476	476	1,518	1,518
1983	12,635	12,473	—	—	3,506	3,461	([7])	—	1,673	1,652	395	390	4,601	4,542	786	776	435	429	1,239	1,223
1984	12,710	12,093	—	—	3,622	3,446	([7])	—	1,553	1,478	383	364	4,620	4,396	773	735	429	408	1,330	1,265
1985	12,938	12,013	—	—	3,455	3,208	([7])	—	2,146	1,993	361	335	4,494	4,173	[8]1,204	1,118	([8])	—	1,278	1,187
1986	12,780	11,618	—	—	2,799	2,545	([7])	—	2,120	1,927	361	328	4,601	4,183	[8]1,194	1,085	([8])	—	1,705	1,550

[1] The years 1922–76 are on a July–June fiscal year; years 1977–present are on an October–September fiscal year.

[2] Converted to 1982 dollars by dividing the appropriations in current dollars by the implicit price deflators for gross national product for total Federal Government purchases of goods and services from 1922–71 and for nondefense Federal Government purchases of goods and services from 1972–86, as reported by the Department of Commerce, Bureau of Economic Analysis. There is no implicit price deflator for gross national product for years prior to 1929. Fiscal years were deflated with calendar year implicit price deflators.

[3] Includes funds allocated for cooperative aid; insect and disease control detection and appraisal; range; recreation; requirements and supply; research construction; watershed activities such as soil erosion, forest influences, and flood control; wildlife and fish habitat; and miscellaneous.

[4] Data not available.

[5] Proposed allocation.

[6] Forest management and range for these years were estimated.

[7] Included in insect research starting in 1974.

[8] Combined into Forest Products and Harvesting in 1985.

Note: Data may not add to totals because of rounding.

Table 2.17—Federal funds allocated to the Southeastern Forest Experiment Station for forest research, by functional activity, 1932–86

	Total allocation		Functional activity: Fire		Insect		Disease		Renewable resources evaluation		Renewable resources economics		Timber management		Forest products utilization		Other[3]	
Year[1]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]	Current dollars	1982 dollars[2]
									Thousands									
1932	51	691	—	—	—	—	—	—	—	—	—	—	45	610	—	—	6	81
1933	(4)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1934	(4)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1935	40	440	—	—	—	—	—	—	—	—	—	—	34	381	—	—	5	59
1936	58	607	—	—	—	—	—	—	17	179	—	—	36	378	—	—	5	51
1937	87	885	—	—	—	—	—	—	10	102	—	—	72	734	—	—	5	49
1938	115	1,136	—	—	—	—	—	—	20	198	—	—	72	712	—	—	23	226
1939[5]	141	1,451	—	—	—	—	—	—	46	474	—	—	72	741	—	—	23	235
1940	166	1,712	—	—	—	—	—	—	65	670	—	—	68	705	—	—	33	337
1941	252	2,272	—	—	—	—	—	—	77	694	—	—	64	576	—	—	111	1,002
1942	182	1,419	—	—	—	—	—	—	74	578	—	—	64	499	—	—	44	341
1943	(4)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1944	130	1,051	—	—	—	—	—	—	22	177	—	—	42	339	—	—	66	535
1945	(4)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1946	238	1,981	13	111	—	—	—	—	15	125	—	—	162	1,347	17	143	30	254
1947	548	3,701	—	—	—	—	—	—	65	439	—	—	333	2,249	18	119	132	893
1948[6]	520	3,188	—	—	—	—	—	—	60	368	—	—	401	2,461	19	117	39	242
1949[6]	511	2,901	—	—	—	—	—	—	60	340	—	—	393	2,235	19	105	39	220
1950[6]	525	3,223	—	—	—	—	—	—	62	380	17	106	388	2,383	20	120	38	235
1951	536	2,976	20	110	—	—	—	—	72	400	17	92	303	1,681	20	109	105	583
1952	519	2,687	20	103	—	—	—	—	72	373	9	35	298	1,542	18	93	104	541
1953[6]	562	2,867	—	—	—	—	—	—	84	429	15	77	388	1,977	22	110	54	276
1954	555	2,820	20	104	—	—	—	—	85	431	14	74	307	1,556	22	111	107	544
1955	707	3,432	25	124	31	149	62	302	90	437	15	70	320	1,554	22	107	142	689
1956	935	4,348	25	118	31	143	62	288	90	419	15	70	439	2,043	103	480	169	787
1957	1,110	4,932	40	178	45	200	68	302	120	533	42	187	484	2,151	115	512	195	868
1958	1,315	5,434	132	546	48	198	83	343	165	680	44	180	510	2,108	120	497	214	884
1959	1,524	6,194	202	822	48	195	83	337	165	669	44	177	644	2,616	120	489	219	891
1960	1,638	6,631	214	866	52	209	88	355	173	701	46	188	692	2,802	127	514	246	996
1961	2,143	8,571	215	859	77	308	113	451	174	695	47	187	740	2,958	142	569	6362	,545
1962	2,890	11,158	275	1,062	132	511	215	830	202	782	74	286	848	3,275	162	627	980	3,785
1963	2,683	10,123	278	1,049	163	615	269	1,016	200	756	86	323	771	2,909	176	663	740	2,791
1964	2,682	9,860	294	1,082	270	994	346	1,272	213	784	91	335	819	3,010	278	1,021	370	1,362

Table 2.17—Federal funds allocated to the Southeastern Forest Experiment Station for forest research, by functional activity, 1932–86—Continued

Year[1]	Total allocation Current dollars	Total allocation 1982 dollars[2]	Fire Current dollars	Fire 1982 dollars[2]	Insect Current dollars	Insect 1982 dollars[2]	Disease Current dollars	Disease 1982 dollars[2]	Renewable resources evaluation Current dollars	Renewable resources evaluation 1982 dollars[2]	Renewable resources economics Current dollars	Renewable resources economics 1982 dollars[2]	Timber management Current dollars	Timber management 1982 dollars[2]	Forest products utilization Current dollars	Forest products utilization 1982 dollars[2]	Other[3] Current dollars	Other[3] 1982 dollars[2]
									Thousands									
1965	3,121	11,108	299	1,065	424	1,508	426	1,515	241	857	93	330	925	3,292	309	1,099	405	1,441
1966	3,606	12,265	469	1,595	459	1,560	435	1,479	248	842	94	321	950	3,230	317	1,077	635	2,161
1967	4,679	15,341	459	1,506	502	1,647	454	1,487	283	929	153	501	1,090	3,573	325	1,066	1,413	4,633
1968	4,239	13,123	470	1,454	515	1,593	469	1,453	314	971	163	503	1,170	3,621	332	1,028	807	2,498
1969	4,065	12,026	464	1,372	533	1,578	487	1,439	325	961	168	497	1,255	3,714	345	1,022	488	1,443
1970	4,238	11,516	480	1,304	550	1,493	529	1,437	357	970	172	466	1,292	3,512	356	966	503	1,367
1971	4,554	11,442	509	1,279	587	1,474	526	1,321	427	1,073	182	456	1,408	3,538	379	951	537	1,349
1972	5,162	11,029	570	1,217	646	1,380	575	1,229	466	995	198	423	1,708	3,649	416	890	583	1,246
1973	5,718	11,694	1,098	2,245	649	1,326	577	1,180	467	956	199	406	1,720	3,518	418	855	590	1,207
1974	5,580	10,469	918	1,722	1,226	2,300	([7])	—	467	877	169	316	1,792	3,362	418	785	590	1,107
1975	6,195	10,223	979	1,615	1,331	2,196	([7])	—	516	852	184	304	1,971	3,253	546	900	669	1,103
1976	7,649	11,896	1,122	1,745	1,908	2,967	([7])	—	630	980	193	300	2,368	3,682	606	943	821	1,277
1977	8,404	12,162	1,202	1,739	2,001	2,896	([7])	—	974	1,409	207	300	2,524	3,653	622	900	874	1,265
1978	9,687	13,380	1,251	1,728	2,071	2,861	([7])	—	1,328	1,835	216	298	3,014	4,162	652	900	1,155	1,596
1979	10,053	12,888	1,297	1,663	2,067	2,650	([7])	—	1,380	1,769	222	285	3,188	4,087	682	874	1,217	1,560
1980	10,173	11,774	1,364	1,579	2,103	2,434	([7])	—	1,430	1,655	253	293	3,066	3,549	886	1,025	1,071	1,240
1981	11,688	12,394	1,459	1,547	2,303	2,442	([7])	—	1,656	1,756	384	407	3,699	3,923	1,084	1,150	1,103	1,170
1982	10,683	10,683	1,276	1,276	1,990	1,990	([7])	—	1,487	1,487	330	330	3,285	3,285	1,342	1,342	973	973
1983	10,368	10,235	1,257	1,241	2,179	2,151	([7])	—	1,614	1,593	343	339	3,095	3,055	866	855	1,014	1,001
1984	10,172	9,678	1,172	1,115	2,016	1,918	([7])	—	1,486	1,414	334	318	3,297	3,137	846	805	1,021	971
1985	11,289	10,482	1,132	1,051	2,097	1,947	([7])	—	2,079	1,930	315	292	3,393	3,150	834	774	1,439	1,336
1986	13,102	11,911	1,111	1,010	2,363	2,148	([7])	—	4,003	3,639	315	286	3,241	2,946	642	584	1,427	1,297

[1] The years 1921–76 are on a July–June fiscal year; years 1977–present are on an October–September fiscal year.

[2] Converted to 1982 dollars by dividing the appropriations in current dollars by the implicit price deflators for gross national product for total Federal Government purchases of goods and services from 1932–71 and for nondefense Federal Government purchases of goods and services from 1972–86, as reported by the Department of Commerce, Bureau of Economic Analysis. Fiscal years were deflated with calendar year implicit price deflators.

[3] Includes funds allocated for cooperative aid; insect and disease control detection and appraisal; range; recreation; requirements and supply; research construction; watershed activities such as soil erosion, forest influences, and flood control; wildlife and fish habitat; and miscellaneous.

[4] Data not available.

[5] Proposed allocation.

[6] Forest management and range for these years were estimated.

[7] Included in insect research starting in 1974.

Note: Data may not add to totals because of rounding.

Table 2.18—Federal and State expenditures for forest management assistance[1] in the South, by region, 1951–85

Year[2]	South						Southeast						South Central					
	Total		Federal		State		Total		Federal		State		Total		Federal		State	
	Current dollars	1982 dollars[3]	Current dollars	1982 dollars[3]	Current dollars	1982 dollars[3]	Current dollars	1982 dollars[3]	Current dollars	1982 dollars[3]	Current dollars	1982 dollars[3]	Current dollars	1982 dollars[3]	Current dollars	1982 dollars[3]	Current dollars	1982 dollars[3]
	Thousands																	
1951	463	2,572	196	1,089	267	1,483	280	1,556	107	594	173	961	183	1,017	90	500	94	522
1952	504	2,611	192	995	311	1,611	315	1,632	109	565	206	1,067	189	979	83	430	105	544
1953	524	2,673	197	1,005	327	1,668	360	1,837	117	597	243	1,240	165	842	81	413	84	429
1954	534	2,711	193	980	341	1,731	366	1,858	114	579	252	1,279	168	853	79	401	89	452
1955	592	2,874	194	942	398	1,932	411	1,995	113	549	298	1,447	181	879	80	388	100	485
1956	645	3,000	193	898	451	2,098	453	2,107	115	535	338	1,572	192	893	79	367	113	526
1957	733	3,258	282	1,253	452	2,009	546	2,427	190	844	356	1,582	187	831	91	404	96	427
1958	985	4,070	421	1,740	564	2,331	720	2,975	290	1,198	430	1,777	265	1,095	132	545	134	554
1959	1,235	5,020	441	1,793	794	3,228	887	3,606	282	1,146	606	2,463	348	1,415	159	646	189	768
1960	1,299	5,259	448	1,814	851	3,445	931	3,769	286	1,158	645	2,611	368	1,490	162	656	206	834
1961	1,493	5,972	443	1,772	1,050	4,200	1,038	4,152	275	1,100	764	3,056	454	1,816	168	672	287	1,148
1962	1,884	7,274	777	3,000	1,107	4,274	1,332	5,143	523	2,019	809	3,124	553	2,135	254	981	298	1,151
1963	1,968	7,426	752	2,838	1,215	4,585	1,358	5,125	489	1,845	869	3,279	609	2,298	263	992	346	1,306
1964	2,212	8,132	751	2,761	1,461	5,371	1,521	5,592	484	1,779	1,037	3,813	691	2,540	267	982	424	1,559
1965	2,428	8,641	897	3,192	1,531	5,448	1,692	6,021	589	2,096	1,103	3,925	736	2,619	308	1,096	428	1,523
1966	2,610	8,878	1,089	3,704	1,521	5,173	1,850	6,293	725	2,466	1,125	3,827	760	2,585	364	1,238	396	1,347
1967	2,740	8,984	1,076	3,528	1,664	5,456	1,940	6,361	713	2,338	1,228	4,026	800	2,623	363	1,190	436	1,430
1968	2,990	9,257	1,076	3,331	1,914	5,926	2,173	6,728	704	2,180	1,469	4,548	817	2,529	372	1,152	445	1,378
1969	3,241	9,589	1,055	3,121	2,187	6,470	2,328	6,888	681	2,015	1,647	4,873	913	2,701	374	1,107	539	1,595
1970	4,245	11,535	1,256	3,413	2,989	8,122	3,150	8,560	798	2,168	2,352	6,391	1,095	2,976	459	1,247	637	1,731
1971	5,166	12,980	1,684	4,231	3,482	8,749	3,585	9,008	1,022	2,568	2,564	6,442	1,581	3,972	663	1,666	918	2,307
1972	5,816	12,427	1,646	3,517	4,170	8,910	4,061	8,677	995	2,126	3,066	6,551	1,755	3,750	651	1,391	1,104	2,359
1973	7,456	15,247	1,621	3,315	5,835	11,933	4,607	9,421	981	2,006	3,626	7,415	2,849	5,826	640	1,309	2,209	4,517
1974	9,239	17,334	1,613	3,026	7,626	14,308	5,233	9,818	980	1,839	4,253	7,979	4,007	7,518	634	1,189	3,373	6,328
1975	10,571	17,444	1,843	3,041	8,728	14,403	5,932	9,789	1,090	1,799	4,842	7,990	4,639	7,655	753	1,243	3,886	6,413
1976	13,090	20,358	1,849	2,876	11,241	17,482	8,261	12,848	1,060	1,649	7,201	11,199	4,829	7,510	789	1,227	4,040	6,283
1977	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
1978	23,170	32,003	4,215	5,822	18,955	26,181	10,521	14,532	2,193	3,029	8,328	11,503	12,649	17,471	2,022	2,793	10,627	14,678
1979	19,861	25,463	3,450	4,423	16,411	21,040	11,334	14,531	1,868	2,395	9,466	12,136	8,527	10,932	1,582	2,028	6,945	8,904
1980	22,370	25,891	4,011	4,642	18,359	21,249	12,984	15,028	2,540	2,940	10,444	12,088	9,386	10,863	1,471	1,703	7,915	9,161
1981	23,137	24,536	5,589	5,927	17,548	18,609	14,770	15,663	3,041	3,225	11,729	12,438	8,367	8,873	2,548	2,702	5,819	6,171
1982	23,753	23,753	4,685	4,685	19,068	19,068	14,441	14,441	2,603	2,603	11,838	11,838	9,312	9,312	2,082	2,082	7,230	7,230
1983	25,777	25,446	3,357	3,314	22,420	22,132	13,884	13,706	1,754	1,731	12,130	11,974	11,893	11,740	1,603	1,582	10,290	10,158
1984	27,593	26,254	1,560	1,484	26,033	24,770	15,432	14,683	838	797	14,594	13,886	12,161	11,571	722	687	11,439	10,884
1985[5]	25,682	23,802	1,541	1,428	24,141	22,373	12,968	12,019	827	766	12,141	11,252	12,714	11,783	714	662	12,000	11,121

[1] Federal assistance to States and State contributions to Cooperative Forest Management (CFM) and Rural Forestry Assistance (RFA) programs. Budgeted amounts are provided when actual expenditures are not available.

[2] Fiscal year.

[3] Converted to 1982 dollars by dividing the expenditures in current dollars by the implicit price deflators for gross national product for all Federal Government purchases of goods and services for 1951–71 and for nondefense Federal Government purchases of goods and services for 1972–85, as reported by the U.S.Department of Commerce, Bureau of Economic Analysis.

[4] Data not available.

[5] Preliminary figures.

Note: Data may not add to totals because of rounding.

Table 2.19—Stand improvement[1] in the South, by ownership and region, 1974–85

Thousand acres

	South					Southeast					South Central				
Year[2]	Total	Industry[3]	Other private	National forest	Other public	Total	Industry[3]	Other private	National forest	Other public	Total	Industry[3]	Other private	National forest	Other public
1974	708	461	189	49	9	276	138	117	19	2	433	323	72	31	7
1975	616	397	156	56	7	263	136	102	23	1	354	262	54	32	6
1976	660	390	194	66	10	297	130	133	29	5	363	260	61	37	5
1977	437	297	77	53	10	91	41	20	23	6	346	255	58	30	4
1978	483	222	150	111	5	87	14	37	36	([4])	396	208	113	75	4
1979	611	385	84	96	46	67	14	22	29	3	543	371	62	67	43
1980	605	419	105	77	4	65	24	19	21	1	540	395	86	56	3
1981	594	324	179	83	8	89	23	42	22	2	505	301	137	61	6
1982	1,184	867	195	75	45	281	201	55	23	2	903	667	141	52	43
1983	1,084	748	227	93	17	299	198	72	23	5	786	550	155	69	12
1984	1,044	614	322	88	20	139	54	64	19	3	905	560	259	69	17
1985	780	485	191	91	13	92	12	55	23	2	687	473	136	68	11

[1] Includes intermediate stand treatments to increase timber growth or to enhance timber quality, such as release and weeding, precommercial thinning, pruning, fertilizing, and prescribed burning for control of understory species.

[2] Fiscal year.

[3] Forest industry and mining, railroad, or utility companies.

[4] Less than 500 acres.

Note: Data may not add to totals because of rounding. Data reported in the annual planting reports are from a wide variety of sources and vary considerably in quality and accuracy. Therefore, data in this table may be incomplete.

Source: U.S. Department of Agriculture, Forest Service. [Annual reports.] National Forest System reforestation and timber stand improvement. Washington, DC: U.S. Department of Agriculture, Forest Service. U.S. Department of Agriculture, Forest Service. [Annual reports.] 1980 (etc.) Forest planting report. Washington, DC: U.S. Department of Agriculture, Forest Service.

Table 2.20—Stand improvement[1] in the Southeast region, by ownership and State, 1974–85[1]

Thousand acres

Year[2]	Southeast					Virginia				
	Total	Industry[3]	Other private	National forest	Other public	Total	Industry[3]	Other private	National forest	Other public
1974	276	138	117	19	2	17	(4)	11	5	1
1975	263	136	102	23	1	39	1	32	6	(5)
1976	297	130	133	29	5	53	3	39	9	2
1977	91	41	20	23	6	26	4	15	7	(5)
1978	87	14	37	36	(5)	19	(4)	12	8	(4)
1979	67	14	22	29	3	7	(4)	2	5	(4)
1980	65	24	19	21	1	11	1	5	4	1
1981	89	23	42	22	2	28	1	22	4	1
1982	281	201	55	23	2	20	3	14	3	(5)
1983	299	198	72	23	5	31	6	20	4	(4)
1984	139	54	64	19	3	27	(5)	23	4	(4)
1985	92	12	55	23	2	27	(4)	24	3	(4)

Year[2]	North Carolina					South Carolina				
	Total	Industry[3]	Other private	National forest	Other public	Total	Industry[3]	Other private	National forest	Other public
1974	13	6	(5)	6	(5)	187	101	80	5	(5)
1975	11	6	1	5	(5)	167	111	55	1	(5)
1976	12	3	2	7	1	201	112	85	3	2
1977	13	3	2	7	1	8	5	1	3	(5)
1978	10	(4)	3	7	(4)	16	(4)	9	8	(5)
1979	10	(4)	3	7	(4)	16	(4)	7	9	(4)
1980	17	9	4	4	(5)	11	(4)	6	5	(4)
1981	13	7	2	3	(5)	18	(4)	12	6	(4)
1982	33	29	2	2	(5)	150	130	15	5	(5)
1983	13	5	3	4	1	183	165	12	6	(5)
1984	45	39	3	3	(5)	22	13	6	4	(5)
1985	27	5	3	3	(5)	19	7	7	5	(5)

Table 2.20—Stand improvement[1] in the Southeast region, by ownership and State, 1974–85[1]—Continued

Thousand acres

	Georgia					Florida				
Year[2]	Total	Industry[3]	Other private	National forest	Other public	Total	Industry[3]	Other private	National forest	Other public
1974	54	31	21	1	1	6	([4])	5	1	([4])
1975	33	19	12	1	1	12	([4])	1	11	([4])
1976	21	12	6	2	1	10	([4])	1	9	([4])
1977	34	30	2	2	([5])	10	([4])	1	4	5
1978	33	14	12	7	([5])	8	([4])	1	7	([4])
1979	28	14	8	6	([5])	7	([4])	2	3	2
1980	20	14	2	4	([5])	5	([4])	2	3	([4])
1981	23	14	2	6	([5])	8	1	3	3	1
1982	56	39	13	3	2	20	([4])	10	10	([4])
1983	24	([4])	15	7	2	48	22	21	2	2
1984	23	([4])	16	5	2	22	2	16	3	1
1985	14	([4])	7	7	([4])	21	([4])	14	6	1

[1] Includes intermediate stand treatments to increase timber growth or to enhance timber quality, such as release and weeding, precommercial thinning, pruning, fertilizing, and prescribed burning for control of understory species.

[2] Fiscal year.

[3] Forest industry and mining, railroad, or utility companies.

[4] None reported.

[5] Less than 500 acres.

Note: Data may not add to totals due to rounding. Data reported in the annual planting reports are from a wide variety of sources and vary considerably in quality and accuracy. Therefore, data in this table may be incomplete.

Sources: See footnote on appendix table 2.19.

Table 2.21—Stand improvement[1] in the South Central region, by ownership and State, 1974–85

Thousand acres

Year[2]	South Central Total	Industry[3]	Other private	National forest	Other public	Alabama Total	Industry[3]	Other private	National forest	Other public
1974	433	323	72	31	7	77	55	17	4	1
1975	354	262	54	32	6	91	66	21	3	1
1976	363	260	61	37	5	82	60	19	3	(5)
1977	346	255	58	30	4	74	60	12	2	(4)
1978	396	208	113	75	(4)	11	(4)	6	5	(4)
1979	543	371	62	67	43	27	13	11	3	(4)
1980	540	395	86	56	3	18	(4)	13	5	1
1981	505	301	137	61	6	19	(4)	17	2	(4)
1982	903	667	141	52	43	137	100	35	2	(4)
1983	786	550	155	69	12	145	100	39	6	1
1984	905	560	259	69	17	260	100	150	8	2
1985	687	473	136	68	11	48	(4)	38	7	11

Year[2]	Mississippi Total	Industry[3]	Other private	National forest	Other public	Tennessee Total	Industry[3]	Other private	National forest	Other public
1974	86	35	40	5	6	2	(4)	(4)	2	(4)
1975	60	35	15	5	5	3	(4)	(4)	2	(5)
1976	38	10	17	6	5	1	(4)	(4)	1	(4)
1977	14	(4)	6	5	4	12	3	4	5	(5)
1978	96	37	24	35	(4)	8	(4)	4	4	(4)
1979	50	(4)	14	33	3	9	4	1	4	(5)
1980	82	38	16	26	2	4	(4)	1	3	(4)
1981	71	8	26	32	6	3	(4)	1	3	(4)
1982	57	(4)	28	22	7	4	(4)	1	3	(4)
1983	77	(4)	45	25	7	6	(5)	(5)	5	(5)
1984	80	(4)	38	31	11	7	4	(5)	3	(4)
1985	74	(4)	38	25	4	4	1	(5)	3	(4)

Year[2]	Arkansas Total	Industry[3]	Other private	National forest	Other public	Louisiana Total	Industry[3]	Other private	National forest	Other public
1974	93	75	5	13	(5)	23	17	2	4	(5)
1975	107	83	9	16	(5)	25	17	5	4	(5)
1976	116	86	9	20	(5)	71	61	6	4	(4)
1977	124	92	15	17	(4)	73	66	7	1	(5)
1978	153	93	38	22	(4)	86	69	16	2	(4)
1979	68	30	17	21	(4)	364	316	5	4	[illegible]
1980	78	49	11	18	(5)	336	301	33	2	(4)
1981	83	53	9	21	(5)	278	238	38	1	(4)
1982	75	46	8	22	(4)	454	413	38	2	1
1983	86	50	9	27	(4)	277	249	24	3	1
1984	108	82	4	23	(4)	263	222	38	3	1
1985	118	83	5	29	(5)	217	191	24	1	(5)

Table 2.21—Stand improvement[1] in the South Central region, by ownership and State, 1974–85—Continued

Thousand acres

	Texas					Oklahoma				
	Total	Industry[3]	Other private	National forest	Other public	Total	Industry[3]	Other private	National forest	Other public
1974	85	77	6	2	(4)	67	63	3	(6)	(4)
1975	2	(4)	(4)	2	(4)	65	61	4	(6)	(4)
1976	10	4	4	2	(4)	45	39	6	(6)	(4)
1977	6	(4)	6	(5)	(4)	43	34	9	(6)	(4)
1978	20	(4)	13	7	(4)	22	9	13	(6)	(4)
1979	13	(4)	11	2	(4)	10	8	2	(6)	(4)
1980	13	(4)	11	1	(4)	9	6	3	(6)	(4)
1981	46	(4)	44	2	(4)	4	2	2	(6)	(4)
1982	164	100	27	2	35	12	8	4	(6)	(4)
1983	184	143	34	4	2	10	7	3	(6)	(4)
1984	183	152	26	2	3	4	1	3	(6)	(4)
1985	205	178	23	2	3	22	21	1	(6)	(4)

[1] Includes intermediate stand treatments to increase timber growth or to enhance timber quality, such as release and weeding, precommercial thinning, pruning, fertilizing, and prescribed burning for control of understory species.

[2] Fiscal year.

[3] Forest industry and mining, railroad, or utility companies.

[4] None reported.

[5] Less than 500 acres.

[6] Ouachita National Forest in Oklahoma is included in Arkansas.

Note: Data may not add to totals because of rounding. Data reported in the annual planting reports are from a wide variety of sources and vary considerably in quality and accuracy. Therefore, data in this table may be incomplete.

Sources: See footnote on appendix table 2.19.

Table 2.22—Forest Service and State expenditures for forest insect and disease management in the South, by region, 1965–84

	South						Southeast						South Central					
	Total		Forest Service[1]		State[2]		Total		Forest Service[1]		State[2]		Total		Forest Service[1]		State[2]	
Year[3]	Current dollars	1982 dollars[4]	Current dollars	1982 dollars[4]	Current dollars	1982 dollars[4]	Current dollars	1982 dollars[4]	Current dollars	1982 dollars[4]	Current dollars	1982 dollars[4]	Current dollars	1982 dollars[4]	Current dollars	1982 dollars[4]	Current dollars	1982 dollars[4]
									Thousands									
1965	615	2,189	484	1,722	131	466	184	655	154	548	30	107	431	1,534	330	1,174	101	359
1966	1,436	4,884	1,091	3,711	345	1,177	568	1,932	453	1,541	116	395	868	2,952	638	2,170	230	782
1967	1,551	5,085	1,195	3,918	356	1,164	455	1,492	409	1,341	46	151	1,096	3,593	786	2,577	309	1,013
1968	1,487	4,604	1,142	3,536	345	1,068	481	1,489	435	1,347	46	142	1,006	3,115	707	2,189	299	926
1969	1,687	4,991	1,139	3,370	548	1,621	601	1,778	435	1,287	166	491	1,086	3,213	704	2,083	382	1,130
1970	1,866	5,071	1,265	3,438	601	1,633	738	2,005	471	1,280	267	726	1,128	3,065	794	2,158	334	908
1971	1,848	4,643	1,312	3,296	536	1,347	837	2,103	608	1,528	230	578	1,011	2,540	704	1,769	307	771
1972	2,228	4,761	1,631	3,485	597	1,276	873	1,865	629	1,344	244	521	1,355	2,895	1,002	2,141	353	754
1973	4,471	9,143	3,419	6,992	1,052	2,151	902	1,845	656	1,342	246	503	3,569	7,299	2,763	5,650	806	1,648
1974	4,976	9,336	3,259	6,114	1,716	3,220	1,755	3,293	1,213	2,276	542	1,017	3,220	6,041	2,046	3,839	1,174	2,203
1975	5,696	9,399	3,282	5,416	2,414	3,983	2,138	3,528	1,282	2,116	856	1,413	3,558	5,871	2,000	3,300	1,558	2,571
1976	4,857	7,554	2,922	4,544	1,935	3,009	2,076	3,229	1,409	2,192	667	1,037	2,780	4,323	1,513	2,353	1,267	1,970
1977	5,347	7,738	3,192	4,619	2,155	3,119	1,943	2,812	1,147	1,660	796	1,152	3,404	4,926	2,045	2,959	1,359	1,967
1978	4,981	6,880	3,186	4,401	1,795	2,480	1,738	2,401	1,333	1,841	405	559	3,243	4,479	1,853	2,559	1,390	1,920
1979	5,232	6,708	3,717	4,765	1,515	1,942	2,505	3,212	1,978	2,536	527	676	2,726	3,495	1,738	2,228	988	1,267
1980	9,729	11,260	7,120	8,241	2,610	3,021	4,500	5,208	3,563	4,124	937	1,084	5,229	6,052	3,557	4,117	1,673	1,936
1981	7,843	8,317	5,701	6,046	2,142	2,271	3,223	3,418	2,482	2,632	742	787	4,620	4,899	3,220	3,415	1,400	1,485
1982	4,269	4,269	2,902	2,902	1,367	1,367	1,947	1,947	1,357	1,357	589	589	2,322	2,322	1,544	1,544	778	778
1983	6,476	6,393	4,044	3,992	2,432	2,401	2,758	2,723	1,802	1,779	955	943	3,718	3,670	2,242	2,213	1,476	1,457
1984	8,002	7,614	4,735	4,505	3,267	3,108	2,455	2,336	1,556	1,480	899	855	5,547	5,278	3,179	3,025	2,368	2,253

[1] Forest Service expenditures for technical assistance and control work on national forest, other Federal, and State and private lands.

[2] Expenditures by non-Federal agencies for State and private cooperative programs, as reported to the Forest Service.

[3] Fiscal year.

[4] Converted to 1982 dollars by dividing the expenditures in current dollars by the implicit price deflators for gross national product for total Federal Government purchases of goods and services from 1965–71 and for nondefense Federal Government purchases of goods and services from 1972–84, as reported by the U.S. Department of Commerce, Bureau of Economic Analysis.

Note: Data may not add to totals because of rounding.

Table 2.23—Major timber-related provisions of current Federal income tax law

Provision	Current law
Tax rates on ordinary income	Individuals, depending on their income, dependency, and marital status, will be taxed at one of 5 rates, ranging from 11 to 38-1/2 percent, in 1987; and at one of two rates—15 or 28 percent—in 1988 and later years. Beginning in 1989, rate progression will be adjusted annually for inflation. Corporate tax rates also vary with income, but in most instances—i.e., for all taxable income in excess of $100,000—the relevant rate will be 34 percent beginning July 1, 1987. Rate progression is not adjusted for inflation.
Tax rates on long-term capital gains income	Beginning in 1988 for some individuals and in 1987 for others, and on July 1, 1987, for corporations—all long-term capital gains income, including that realized from cutting or selling timber, will be taxed at the same rate as ordinary income.
Deductibility of management costs	Except as provided for in the reforestation incentive provisions discussed below, all management costs directly associated with stand establishment must be "capitalized." This means that such costs can only be recovered by deducting them from the income that is received when the timber to which they are related is cut and/or sold. In contrast, most management costs incurred after stand establishment are "expensable" for certain taxpayers. This means that such costs can be recovered in the same year as paid by deducting them from ordinary income from any source. The exact rules vary by taxpayer category. If the taxpayer is an active business, all management costs, property taxes and interest are fully deductible each year—i.e.,fully expensable. For active investors, property taxes are fully deductible; management expenses must be aggregated with other "miscellaneous itemized deductions" and the total is deductible only to the extent it exceeds 2 percent of adjusted gross income; and interest charges associated with the timber investment are deductible only to the extent of total investment income for the year. Passive participants in a timber investment or business may only deduct property taxes, interest and management costs to the extent of passive income for the year.
Reforestation incentives	Owners have the option, on up to $10,000 of qualifying reforestation expenditures per year, of taking a 10-percent tax credit and amortizing 100 percent of the costs over 84 months. Qualifying reforestation expenditures include site preparation, planting, and seed or seedlings.

Table 2.24—National forest expenditures for regeneration and stand improvement[1] and acres treated on national forests in the South, by region, 1934–85

	South				Southeast				South Central			
	Expenditures		Acres treated		Expenditures		Acres treated		Expenditures		Acres treated	
Year[2]	Current dollars	1982 dollars[3]	Regen-eration	Stand improvement	Current dollars	1982 dollars[3]	Regen-eration	Stand improvement	Current dollars	1982 dollars[3]	Regen-eration	Stand improvement
	Thousands											
1934	([4])	—	6	([4])	([4])	—	1	([4])	([4])	—	5	([4])
1935	([4])	—	17	([4])	([4])	—	1	([4])	([4])	—	16	([4])
1936	([4])	—	32	([4])	([4])	—	1	([4])	([4])	—	31	([4])
1937	([4])	—	54	([4])	([4])	—	([5])	([4])	([4])	—	54	([4])
1938	([4])	—	47	([4])	([4])	—	1	([4])	([4])	—	46	([4])
1939	([4])	—	36	([4])	([4])	—	1	([4])	([4])	—	35	([4])
1940	([4])	—	37	([4])	([4])	—	3	([4])	([4])	—	34	([4])
1941	([4])	—	60	([4])	([4])	—	10	([4])	([4])	—	51	([4])
1942	([4])	—	27	([4])	([4])	—	4	([4])	([4])	—	23	([4])
1943	([4])	—	2	([4])	([4])	—	([5])	([4])	([4])	—	2	([4])
1944	([4])	—	([6])	([4])	([4])	—	([6])	([4])	([4])	—	([6])	([4])
1945	([4])	—	([5])	([4])	([4])	—	([5])	([4])	([4])	—	([6])	([4])
1946	([4])	—	3	([4])	([4])	—	([5])	([4])	([4])	—	3	([4])
1947	([4])	—	4	([4])	([4])	—	1	([4])	([4])	—	3	([4])
1948	([4])	—	5	([4])	([4])	—	1	([4])	([4])	—	4	([4])
1949	([4])	—	12	([4])	([4])	—	3	([4])	([4])	—	9	([4])
1950	([4])	—	12	([4])	([4])	—	3	([4])	([4])	—	9	([4])
1951	([4])	—	27	158	([4])	—	9	32	([4])	—	18	126
1952	([4])	—	41	215	([4])	—	24	46	([4])	—	17	169
1953	([4])	—	23	200	([4])	—	12	38	([4])	—	11	161
1954	1,093	5,548	35	241	183	929	12	30	910	4,619	23	211
1955	1,293	6,277	66	238	223	1,083	9	42	1,070	5,194	57	196
1956	1,458	6,781	24	278	235	1,093	11	45	1,223	5,688	12	233
1957	2,129	9,462	129	330	397	1,764	22	56	1,732	7,698	107	275
1958	2,797	11,558	70	363	644	2,661	36	66	2,153	8,897	34	298
1959	2,610	10,610	67	394	635	2,581	37	66	1,975	8,028	30	327
1960	3,400	13,765	62	348	609	2,466	28	46	2,791	11,300	34	302
1961	3,537	14,148	46	304	685	2,740	14	50	2,852	11,408	32	254
1962	4,714	18,201	54	175	940	3,629	13	23	3,774	14,571	41	153
1963	5,513	20,804	54	174	1,239	4,675	13	22	4,274	16,128	40	152
1964	5,579	20,511	49	207	1,282	4,713	18	37	4,297	15,798	31	170

Table 2.24—National forest expenditures for regeneration and stand improvement[1] and acres treated on national forests in the South, by region, 1934–85—Continued

Year[2]	South				Southeast				South Central			
	Expenditures		Acres treated		Expenditures		Acres treated		Expenditures		Acres treated	
	Current dollars	1982 dollars[3]	Regeneration	Stand improvement	Current dollars	1982 dollars[3]	Regeneration	Stand improvement	Current dollars	1982 dollars[3]	Regeneration	Stand improvement
	Thousands											
1965	5,868	20,883	50	176	1,305	4,644	20	31	4,563	16,238	29	145
1966	5,839	19,861	49	139	1,587	5,398	21	30	4,252	14,463	28	109
1967	6,713	22,010	62	111	2,185	7,164	24	28	4,528	14,846	39	83
1968	6,285	19,458	69	78	2,014	6,235	28	18	4,271	13,223	41	60
1969	6,533	19,328	85	60	2,197	6,500	31	12	4,336	12,828	55	48
1970	7,523	20,443	80	46	2,643	7,182	31	10	4,880	13,261	49	37
1971	9,525	23,932	98	45	3,479	8,741	39	12	6,046	15,191	59	32
1972	13,714	29,303	110	66	5,148	11,000	42	27	8,566	18,303	68	39
1973	14,522	29,697	97	51	5,736	11,731	40	17	8,786	17,967	57	34
1974	16,586	31,118	100	49	6,854	12,859	42	19	9,732	18,259	57	31
1975	16,005	26,411	98	56	5,919	9,767	40	23	10,086	16,644	58	32
1976	26,046	40,507	99	66	10,264	15,963	35	29	15,782	24,544	64	37
1977	16,463	23,825	77	53	6,033	8,731	32	23	10,430	15,094	45	30
1978	19,032	26,287	72	111	6,370	8,798	29	36	12,662	17,489	44	75
1979	18,815	24,122	79	96	6,921	8,873	30	29	11,894	15,249	49	67
1980	20,027	23,179	72	77	7,576	8,769	27	21	12,451	14,411	45	56
1981	23,381	24,794	88	83	7,952	8,433	27	22	15,429	16,362	61	61
1982	22,976	22,976	82	75	7,821	7,821	31	23	15,155	15,155	51	52
1983	28,122	27,761	77	93	10,036	9,907	30	23	18,086	17,854	47	69
1984	26,920	25,614	87	88	8,531	8,117	35	19	18,389	17,497	52	69
1985	28,240	26,172	91	91	8,933	8,279	40	23	19,307	17,893	51	68

[1] Regeneration includes planting, direct seeding, and natural regeneration; stand improvement includes intermediate stand treatments to increase timber growth or enhance timber quality. Prescribed burning to control understory species is not included for 1962–77.

[2] Fiscal year.

[3] Current dollars converted to 1982 dollars by dividing the expenditures in current dollars by the implicit price deflators of gross national product for total Federal Government purchases of goods and services through 1972 and for nondefense Federal Government purchases of goods and services for 1973–85, as reported by the U.S. Department of Commerce, Bureau of Economic Analysis.

[4] Data not available.

[5] Less than 500 acres.

[6] None reported.

Note: Data may not add to totals because of rounding.

Table 2.25—Volume and value of timber cut from National Forest System lands in the South,[1] 1923–43

Year[2]	Volume	Value: Current dollars	Value: 1982 dollars[3]
	Million board feet	*Thousands*	*Thousands*
1923	45	147	—
1924	45	194	—
1925	44	215	—
1926	47	229	—
1927	50	159	—
1928	51	163	—
1929	81	365	4,506
1930	85	391	4,888
1931	40	125	1,563
1932	17	57	713
1933	30	56	700
1934	44	194	2,425
1935	58	297	3,713
1936	79	441	5,513
1937	87	439	4,526
1938	88	474	4,887
1939	91	537	5,536
1940	149	892	9,196
1941	170	1,113	10,027
1942	166	1,070	8,359
1943	213	1,675	13,086

[1] Excludes National Forest System lands in Virginia.

[2] Fiscal year.

[3] Converted to 1982 dollars by dividing expenditures in current dollars by the implicit price deflators for gross national product for total Federal Government purchases of goods and services, as reported by the U.S. Department of Commerce, Bureau of Economic Analysis. There is no implicit price deflator for gross national product for years prior to 1929. For 1930–36, the implicit price deflator for 1933 is used.

Table 2.26—Volume and value of timber cut from National Forest System lands in the South,[1] by region, 1944–85

Year[2]	South Volume	South Value Current dollars	South Value 1982 dollars[3]	Southeast Volume	Southeast Value Current dollars	Southeast Value 1982 dollars[3]	South Central Volume	South Central Value Current dollars	South Central Value 1982 dollars[3]
	Million board feet	*Thousands*	*Thousands*	*Million board feet*	*Thousands*	*Thousands*	*Million board feet*	*Thousands*	*Thousands*
1944	322	2,655	21,411	132	728	5,871	190	1,927	15,540
1945	384	2,586	21,915	158	772	6,542	226	1,814	15,373
1946	337	2,314	19,283	143	633	5,275	194	1,681	14,008
1947	408	2,672	18,054	177	849	5,736	231	1,823	12,318
1948	459	3,712	22,773	185	1,039	6,374	274	2,673	16,399
1949	129	1,624	9,227	42	362	2,057	87	1,262	7,170
1950	476	6,444	39,534	127	1,213	7,442	349	5,231	32,092
1951	514	7,548	41,933	160	1,471	8,172	354	6,077	33,761
1952	483	8,444	43,751	135	1,945	10,078	348	6,499	33,674
1953	517	9,386	47,888	142	2,336	11,918	375	7,050	35,969
1954	537	9,868	50,091	160	2,688	13,645	377	7,180	36,447
1955	620	9,591	46,558	161	2,314	11,233	459	7,277	35,325
1956	698	12,504	58,158	199	2,818	13,107	499	9,686	45,051
1957	619	11,935	53,044	222	3,659	16,262	397	8,276	36,782
1958	641	12,201	50,417	178	3,370	13,926	463	8,831	36,492
1959	819	15,174	61,683	228	4,157	16,898	591	11,017	44,785
1960	833	19,501	78,951	205	4,335	17,551	628	15,166	61,401
1961	800	18,767	75,068	245	5,511	22,044	555	13,256	53,024
1962	766	16,541	63,865	229	5,047	19,486	537	11,494	44,378
1963	804	15,780	59,547	252	4,693	17,709	552	11,087	41,838
1964	780	15,178	55,801	284	5,509	20,254	496	9,669	35,548
1965	844	17,067	60,737	267	5,140	18,292	577	11,927	42,445
1966	849	18,542	63,068	292	5,871	19,969	557	12,671	43,099
1967	890	21,527	70,580	369	7,778	25,502	521	13,749	45,079
1968	743	22,770	70,495	257	9,070	28,080	486	13,700	42,415
1969	875	22,479	66,506	369	7,597	22,476	506	14,882	44,030
1970	922	23,921	65,003	401	8,984	24,413	521	14,937	40,590
1971	872	24,401	61,309	472	11,967	30,068	400	12,434	31,241
1972	1,002	28,111	60,066	392	8,827	18,861	610	19,284	41,205
1973	954	28,412	58,102	406	9,493	19,413	548	18,919	38,689
1974	928	34,590	64,897	438	15,449	28,985	490	19,141	35,912
1975	904	32,931	54,342	315	9,520	15,710	589	23,411	38,632
1976	1,355	60,249	93,700	396	13,725	21,345	959	46,524	72,355
1977	1,005	43,005	62,236	279	9,783	14,158	726	33,222	48,078
1978	1,018	52,436	72,425	266	11,364	15,696	752	41,072	56,729
1979	997	55,904	71,672	333	14,102	18,079	664	41,802	53,592
1980	1,277	73,749	85,358	397	17,215	19,925	880	56,534	65,433
1981	1,116	77,915	82,625	427	20,746	22,000	689	57,169	60,625
1982	794	55,212	55,212	330	17,882	17,882	464	37,330	37,330
1983	1,065	88,002	86,873	398	23,157	22,860	667	64,845	64,013
1984	1,244	104,281	99,221	419	25,443	24,208	825	78,838	75,012
1985	1,349	94,836	87,892	402	22,913	21,235	947	71,923	66,657

[1] National Forest System lands in Virginia excluded prior to fiscal year 1966.

[2] Fiscal year.

[3] Converted to 1982 dollars by dividing expenditures in current dollars by the implicit price deflators for gross national product for total Federal Government purchases of goods and services through 1971 and for nondefense Federal Government purchases of goods and services for 1972–85, as reported by the U.S.Department of Commerce, Bureau of Economic Analysis.

Table 2.27— Estimated woodpulp production in the South,[1] by type of pulp, selected years 1899–1984

Thousand short tons

Year	Total	Sulfate[2]	Other	1984	Total	Sulfate[2]	Other
1899	6	—	6	1955	11,764	9,226	2,538
1904	42	—	42	1956	12,460	9,845	2,615
1905	45	—	45	1957	12,509	9,692	2,817
1906	44	—	44	1958	12,581	9,863	2,718
1907	50	—	50	1959	14,342	11,134	3,208
1908	71	([3])	([3])				
				1960	15,058	11,719	3,339
1910	110	([3])	([3])	1961	15,671	12,184	3,487
1911	112	([3])	([3])	1962	16,531	12,859	3,672
1916	232	25	207	1963	17,888	13,898	3,990
1918	231	([3])	([3])	1964	19,711	15,643	4,068
1919	223	([3])	([3])				
				1965	20,656	16,626	4,030
1920	272	85	187	1966	22,376	18,042	4,334
1921	209	([3])	([3])	1967	22,122	17,926	4,196
1922	308	134	174	1968	23,798	18,709	5,089
1923	347	([3])	([3])	1969	27,430	22,090	5,340
1924	356	([3])	([3])				
				1970	27,871	22,414	5,457
1925	408	261	147	1971	28,530	22,691	5,839
1926	504	([3])	([3])	1972	30,376	24,272	6,104
1927	548	([3])	([3])	1973	31,273	25,111	6,162
1928	646	([3])	([3])	1974	31,403	25,044	6,359
1929	736	([3])	([3])				
				1975	28,413	22,470	5,943
1930	781	([3])	([3])	1977	32,338	26,162	6,176
1932	873	([3])	([3])	1978	33,927	27,478	6,449
1934	1,088	([3])	([3])	1979	33,935	28,183	5,752
1936	1,659	([3])	([3])				
1937	2,220	1,657	563	1980	35,109	28,903	6,206
1938	2,006	([3])	([3])	1981	35,697	30,384	5,313
				1982	34,185	28,782	5,403
1940	3,448	([3])	([3])	1983	36,475	31,368	5,107
1943	4,552	([3])	([3])	1984	38,640	33,083	5,557
1944	4,875	3,702	1,173				
1945	4,889	3,627	1,262				
1946	5,023	3,773	1,250				
1950	8,119	6,302[2]	1,817				
1951	8,870	6,997	1,873				
1952	9,050	7,040	2,010				
1953	9,893	7,751	2,142				

[1] Because of the manner in which wood pulp production and capacity data are customarily reported by the Bureau of the Census and the American Paper Institute, Inc., the data in this table may represent only partial production in the South or some production outside the South, as follows: 1899–07 Virginia only; 1908–10 Virginia and North Carolina only; 1911–40 estimates derived from the South's share of capacity and census data on production for States in the South as well as various other States reported with them; 1943–68 Maryland included; 1969–84 Maryland and Kentucky included.

[2] Sulfate production estimates generally include States outside the South in the same manner as total production. After 1980, sulfate production also includes small amounts of soda production.

[3] Breakdown not available.

Sources: Derived from wood pulp próduction and capacity data reported by the U.S. Department of Commerce, Bureau of the Census; the American Paper Institute, Inc.; and the Southern Pulp and Paper directories.

Table 2.28—Softwood plywood production in the South, by region and State, 1964–84

Million square feet, 3/8-inch basis

		Southeast						South Central[1]						
Year	**South**	Total	Virginia	North Carolina	South Carolina	Georgia	Florida	Total	Alabama	Mississippi	Arkansas	Louisiana	Texas	Oklahoma
1964	80	—	—	—	—	—	—	80	—	—	65	—	15	—
1965	402	22	—	22	—	—	—	380	8	5	171	80	116	—
1966	1,130	177	65	98	—	14	—	953	36	71	368	308	170	—
1967	1,745	309	77	145	—	45	42	1,436	40	241	440	537	178	—
1968	2,327	509	91	206	—	135	77	1,818	153	304	515	652	194	—
1969	2,827	639	102	215	68	176	78	2,188	289	344	577	755	223	—
1970	3,266	862	140	218	136	283	85	2,404	355	397	529	873	250	—
1971	4,450	1,088	144	263	144	416	121	3,362	459	613	697	1,158	430	5
1972	5,263	1,249	137	383	166	423	140	4,014	544	666	808	1,210	701	85
1973	5,511	1,363	165	400	223	422	153	4,148	568	687	818	1,215	770	90
1974	5,083	1,253	155	365	243	396	94	3,830	503	709	701	1,088	753	76
1975	5,625	1,394	172	350	346	526	—	4,231	596	780	741	1,071	966	77
1976	6,759	1,693	177	388	456	672	—	5,066	718	864	769	1,422	1,236	57
1977	7,390	1,911	176	430	527	683	95	5,479	764	896	862	1,506	1,345	106
1978	7,838	2,046	180	466	533	752	115	5,792	925	937	884	1,539	1,428	79
1979	8,273	2,099	177	482	530	800	110	6,174	1,055	957	868	1,696	1,499	99
1980	7,337	1,871	101	546	370	740	114	5,466	917	928	785	1,242	1,501	93
1981	8,255	2,342	192	629	477	846	198	5,913	1,033	918	1,095	1,225	1,547	95
1982	8,419	2,552	200	658	543	881	270	5,867	1,028	829	1,231	1,076	1,601	102
1983	9,441	2,669	200	670	560	899	340	6,772	1,096	921	1,272	1,542	1,832	109
1984	9,671	2,757	200	682	590	917	368	6,914	1,138	957	1,313	1,591	1,804	111

[1] No softwood plywood is produced in Tennessee.

Sources: *1964–82*— Anderson, Robert G. 1984. Regional production and distribution patterns of the structural panel industry. Tacoma, WA: American Plywood Association. 34 p. *1983–84*— [Derived from estimates of plywood shipments in] U.S. Department of Commerce, Bureau of the Census. 1986. Current industrial reports: softwood plywood MA-24H(84) . Washington, DC: U.S. Department of Commerce, Bureau of the Census. 7 p.

Table 2.29— Average pine stumpage prices for sawtimber and pulpwood in the South, by source of price data, selected years 1880–1985

	Sawtimber[1]								Pulpwood[1]					
	South— private[2]		NC/VA— private[3]		South— public[4]		Lousiana— private[5]		South— private[6]		South— public[7]		Lousiana— private[5]	
Year	Current dollars	1985 dollars[8]	Current dollars	1985 dollars[8]	Current dollars	1985 dollars[8]	Current dollars	1985 dollars[8]	Current dollars	1985 dollars[8]	Current dollars	1985 dollars[8]	Current dollars	1985 dollars[8]
1880	0.14	1.15	0.32	2.64	—	—	—	—	—	—	—	—	—	—
1885	.17	1.67	.39	3.77	—	—	—	—	—	—	—	—	—	—
1890	.32	3.41	.57	6.24	—	—	—	—	—	—	—	—	—	—
1895	.38	4.39	.85	10.43	—	—	—	—	—	—	—	—	—	—
1900	.88	9.59	.73	7.88	—	—	—	—	—	—	—	—	—	—
1905	2.70	26.11	1.34	12.91	—	—	—	—	—	—	—	—	—	—
1910	1.93	17.15	2.16	19.39	—	—	—	—	—	—	—	—	—	—
1915	2.66	19.52	3.01	22.81	—	—	—	—	—	—	—	—	—	—
1920	3.52	17.31	5.00	24.80	—	—	—	—	—	—	—	—	—	—
1925	3.36	20.18	5.22	31.32	—	—	—	—	—	—	—	—	—	—
1930	3.30	23.95	4.24	30.14	—	—	—	—	—	—	—	—	—	—
1935	3.47	29.57	3.71	31.46	3.63	27.67	—	—	0.83	6.05	0.83	6.05	—	—
1940	—	—	—	—	7.46	52.44	—	—	1.04	7.33	.92	6.63	—	—
1945	—	—	—	—	9.74	50.66	—	—	2.20	11.25	1.00	5.13	—	—
1950	—	—	—	—	27.18	97.93	—	—	3.26	11.85	2.38	8.59	—	—
1955	—	—	—	—	32.96	113.67	31.80	108.24	4.23	14.89	3.73	13.13	3.85	13.08
1960	—	—	—	—	30.72	99.96	29.80	96.97	—	—	—	—	4.20	13.93
1965	—	—	—	—	32.30	102.11	30.72	97.21	—	—	—	—	4.43	14.05
1970	—	—	—	—	51.16	141.98	51.90	143.85	—	—	—	—	4.64	13.13
1975	—	—	—	—	82.78	153.23	95.54	174.29	—	—	—	—	6.29	11.47
1980	—	—	—	—	148.86	178.27	177.30	213.49	—	—	—	—	10.87	12.70
1985	—	—	—	—	140.00	140.00	148.04	148.04	—	—	—	—	16.19	16.19

[1] Unit measure for sawtimber is thousand board feet. See footnotes 4 and 5 for log rule used. Unit measure for pulpwood is standard cords.

[2] Prices for privately owned, second-growth southern pine stumpage in the southern pine region (Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Oklahoma, and Texas) , as reported in Steer, H.B. 1938. Stumpage prices of privately owned timber in the United States. Tech. Bull. 626. Washington, DC: U.S. Department of Agriculture. 162 p.

[3] Prices for privately owned, second–growth southern pine stumpage in North Carolina and Virginia, as reported by Steer (1938).

[4] Prices for national forest timber sales, all species, 1935–49, Scribner C log rule, as reported in U.S. Department of Agriculture, Forest Service. 1964. The demand and price situation for forest products, 1964. Misc. Publ. 983. Washington, DC: U.S. Department of Agriculture, Forest Service. 50 p. Prices for national forest timber sales, southern pine only, 1950–84, Scribner C log rule, as reported in U.S. Department of Agriculture, Forest Service. 1985. U.S. timber production, trade, consumption, and price statistics. Misc. Publ. 1450. Washington, DC: U.S. Department of Agriculture, Forest Service. 84 p.

[5] Prices for privately owned pine stumpage in Louisiana, Doyle log rule for sawtimber, as reported by Louisiana Department of Agriculture, Office of Marketing. [Quarterly issues.] Quarterly forest products reports. Baton Rouge, LA: Louisiana Department of Agriculture, Office of Marketing.

[6] Prices for privately owned southern pine, 1937–55, as reported by USDA Forest Service.

[7] Prices for national forest timber sales, southern pine, 1935–55, as reported by USDA Forest Service.

[8] Derived by dividing the price in current dollars by the Bureau of Labor Statistics producer price index for all commodities (1985 = 100).

Note: Prices are computed as a 5–year moving average for available years of each series.

Table 2.30—Average hardwood stumpage prices for sawtimber and pulpwood in the South, by source of price data, selected years 1905–85

	Sawtimber[1]						Pulpwood[1]	
	South—private[2]		Louisiana—private[3]		South—public[4]		Louisiana—private[3]	
Year	Current dollars	1985 dollars[5]	Current dollars	1985 dollars[5]	Current dollars	1985 dollars[5]	Current dollars	1985 dollars[5]
1905	0.81	8.04	—	—	—	—	—	—
1910	3.90	33.07	—	—	—	—	—	—
1915	3.54	30.41	—	—	—	—	—	—
1920	4.23	16.37	—	—	—	—	—	—
1925	6.23	35.95	—	—	—	—	—	—
1930	3.89	26.88	—	—	—	—	—	—
1935	—	—	—	—	—	—	—	—
1940	—	—	—	—	—	—	—	—
1945	—	—	—	—	—	—	—	—
1950	—	—	—	—	—	—	—	—
1955	—	—	10.33	35.17	—	—	1.60	5.36
1960	—	—	10.94	35.60	20.13	65.43	1.61	5.24
1965	—	—	15.16	47.93	25.06	79.33	1.65	5.23
1970	—	—	20.96	58.41	27.92	77.68	1.95	5.48
1975	—	—	35.54	64.91	39.72	74.40	2.73	5.00
1980	—	—	53.70	63.95	49.52	58.71	3.94	4.66
1985	—	—	68.89	68.89	78.10	75.10	4.53	4.53

[1] Unit measure for sawtimber is thousand board feet. See footnotes 3 and 4 for log rule used. Unit measure for pulpwood is standard cords.

[2] Prices for privately owned hardwood stumpage in the southern pine region (Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Oklahoma, and Texas), as reported in Steer, H.B. 1938. Stumpage prices of privately owned timber in the United States. Tech. Bull. 626. Washington, DC: U.S. Department of Agriculture. 162 p.

[3] Prices for privately owned hardwood, all species, 1935–49, Scribner C log rule, as reported in U.S. Department of Agriculture, Forest Service. 1964. The demand and price situation for forest products, 1964. Misc. Publ. 983. Washington, DC: U.S. Department of Agriculture, Forest Service. 50 p. Prices for national forest timber sales, southern pine only, 1950–84, Scribner C log rule, as reported in U.S. Department of Agriculture, Forest Service. 1985. U.S. timber production, trade, consumption, and price, statistics. Misc. Publ. 1450. Washington, DC: U.S. Department of Agriculture, Forest Service. 84 p.

[4] Prices for national forest timber sales, all eastern hardwoods, eastern and southern regions, Scribner C log rule, as reported by USDA Forest Service, Misc. Publ. 1450, 1985.

[5] Derived by dividing the price in current dollars by the Bureau of Labor Statistics producer price index for all commodities (1985 = 100).

Note: Prices are computed as a 3–year moving average for available years in each series.

Table 2.31—Average pine stumpage prices[1] for sawtimber sold from national forests in the South, by State for selected years 1950–85

Year	South		Alabama		Arkansas		Florida		Georgia		Louisiana	
	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]
	Dollars per thousand board feet, Scribner log rule											
1950	24.11	85.98	14.56	52.00	42.35	150.53	12.17	43.25	13.70	48.67	22.06	78.46
1955	29.92	102.56	23.50	80.14	36.82	126.80	20.51	70.09	26.04	89.17	29.34	100.81
1960	30.77	100.13	30.71	99.92	30.80	100.21	30.95	100.70	31.34	101.97	27.60	89.82
1965	29.77	94.05	29.03	91.80	35.25	111.38	32.11	101.58	33.17	105.19	31.40	98.91
1970	49.67	138.01	46.06	127.99	49.13	137.30	55.07	152.27	42.64	118.96	62.44	173.52
1975	84.34	155.31	77.28	139.68	68.44	125.85	103.85	187.59	57.06	104.50	99.38	184.47
1980	151.73	181.10	116.98	141.08	148.25	175.53	133.64	161.46	95.31	114.68	193.46	232.29
1985	127.72	128.13	135.95	136.28	123.48	123.82	160.01	160.28	106.66	106.87	110.33	110.66

Year	Mississippi		North Carolina		South Carolina		Tennessee		Texas		Virginia	
1950	21.80	77.42	11.90	42.67	27.05	95.83	10.23	36.67	26.27	93.62	—	—
1955	30.96	105.81	16.49	56.18	35.08	120.26	18.38	62.96	32.37	111.04	—	—
1960	30.38	98.84	25.25	82.17	36.19	117.77	24.36	79.26	30.62	99.65	—	—
1965	27.59	87.17	27.46	87.04	37.47	118.64	19.25	60.92	30.65	96.67	10.84	33.43
1970	49.75	137.81	29.36	81.46	47.98	133.63	20.67	57.49	53.41	148.26	12.20	33.80
1975	95.45	174.89	43.56	81.27	81.24	151.59	25.35	48.05	74.50	140.25	18.25	34.81
1980	156.22	186.06	87.13	104.25	125.70	150.39	27.49	32.83	202.51	242.76	13.29	15.68
1985	157.88	158.36	88.21	88.19	145.76	146.13	68.93	69.01	110.31	111.00	31.60	31.56

[1] Prices computed as a 5-year moving average of volume-weighted prices derived from high bids for national forest timber sales.

[2] Derived by dividing the price in current dollars by the Bureau of Labor Statistics producer price index for all commodities (1985 = 100).

Source: U.S. Department of Agriculture, Forest Service.

Table 2.32—Average hardwood stumpage prices[1] for sawtimber sold from national forests in the South, by State for selected years 1950–85

Year	South Current dollars	South 1985 dollars[2]	Alabama Current dollars	Alabama 1985 dollars[2]	Arkansas Current dollars	Arkansas 1985 dollars[2]	Florida Current dollars	Florida 1985 dollars[2]	Georgia Current dollars	Georgia 1985 dollars[2]	Louisiana Current dollars	Louisiana 1985 dollars[2]
	Dollars per thousand board feet, Scribner log rule											
1950	9.57	34.05	7.92	28.58	3.52	12.46	10.12	35.67	15.62	55.68	6.90	24.44
1955	14.54	49.53	9.66	33.03	8.24	27.97	13.70	46.70	21.56	73.65	7.28	24.65
1960	25.22	82.04	13.16	42.82	16.59	53.99	22.97	74.74	29.64	96.43	7.35	23.93
1965	21.34	67.93	18.42	58.40	28.53	90.09	25.14	80.07	26.61	84.30	11.11	34.91
1970	22.22	61.64	24.03	66.46	28.97	80.60	15.29	34.79	27.39	73.02	14.31	39.91
1975	41.48	76.07	23.46	41.72	32.17	60.64	—	—	48.57	89.18	28.38	52.29
1980	52.24	62.45	22.47	28.62	70.30	83.32	—	—	65.53	79.83	32.67	39.75
1985	59.74	59.88	24.86	24.84	117.78	118.07	—	—	50.51	50.57	27.26	27.24

Year	Mississippi Current dollars	Mississippi 1985 dollars[2]	North Carolina Current dollars	North Carolina 1985 dollars[2]	South Carolina Current dollars	South Carolina 1985 dollars[2]	Tennessee Current dollars	Tennessee 1985 dollars[2]	Texas Current dollars	Texas 1985 dollars[2]	Virginia Current dollars	Virginia 1985 dollars[2]
1950	10.40	36.85	12.36	44.16	16.19	57.35	12.28	43.88	5.42	19.43	—	—
1955	10.34	35.07	18.18	62.10	20.62	70.26	22.43	76.65	6.92	26.34	—	—
1960	13.82	44.97	29.61	96.32	35.27	114.77	27.16	88.38	21.09	39.32	—	—
1965	19.25	60.72	19.13	60.54	31.18	99.50	25.17	80.06	17.72	56.15	19.96	24.63
1970	27.60	76.85	22.23	62.15	31.16	88.63	17.86	49.33	18.65	51.85	16.90	47.17
1975	42.42	75.90	37.04	71.71	30.90	57.14	34.82	61.80	27.77	51.17	30.96	56.26
1980	56.69	68.07	58.73	68.69	46.78	59.43	26.72	32.76	41.11	50.60	33.55	39.97
1985	49.90	50.01	72.42	72.47	51.40	51.54	50.21	50.14	33.13	33.38	49.13	49.19

[1] Prices computed as a 5-year moving average of volume-weighted prices derived from high bids for national forest timber sales.

[2] Derived by dividing the price in current dollars by the Bureau of Labor Statistics producer price index for all commodities (1985 = 100).

Source: U.S. Department of Agriculture, Forest Service.

[This page intentionally left blank.]

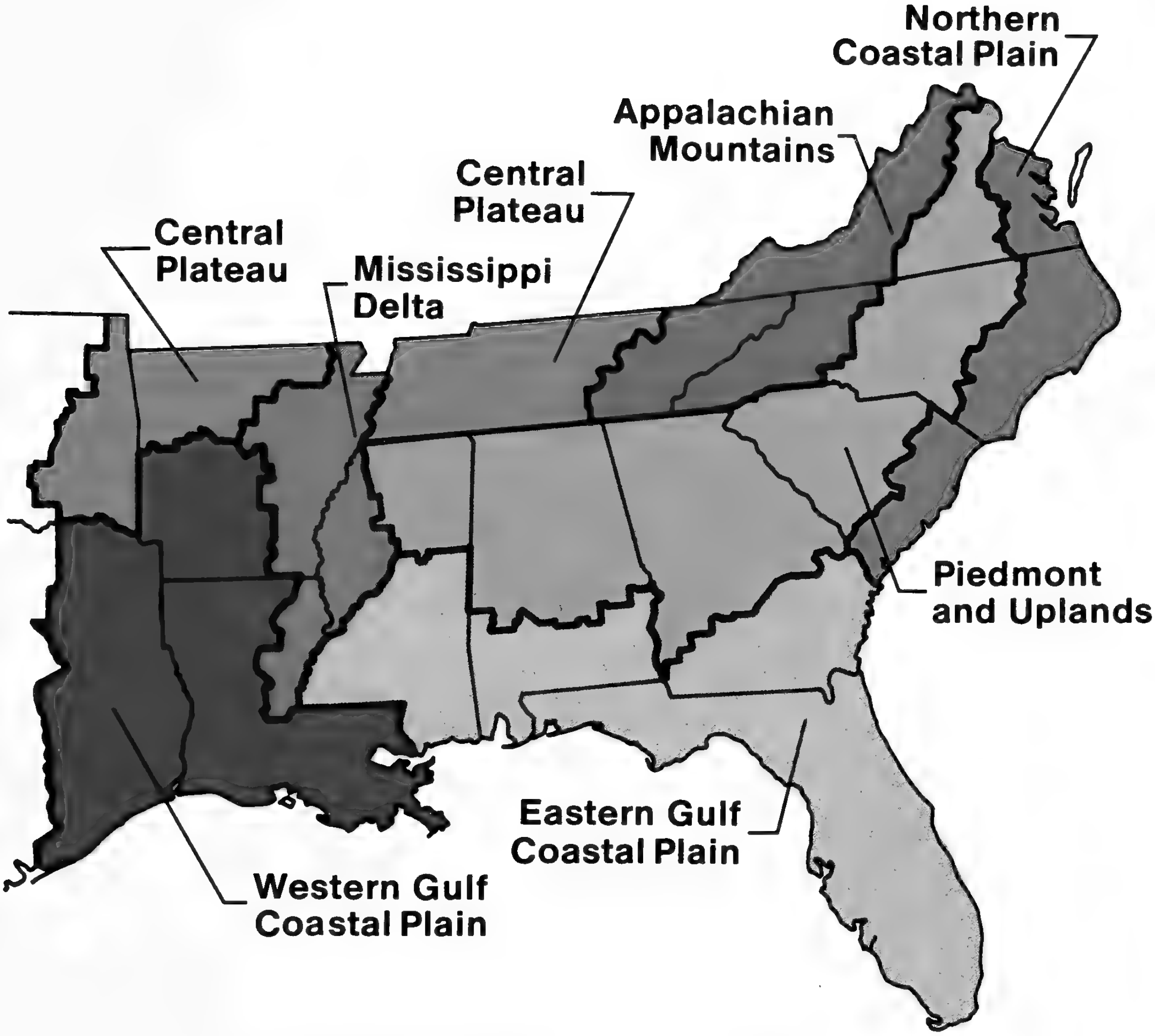
Table 2.33—Average pine stumpage prices for sawtimber, veneer timber, and pulpwood in the South, by region[1] and product, 1977–85

	South		Northern coastal plain		East Gulf coastal plain		West Gulf coastal plain		Piedmont and uplands		Mississippi delta		Central plateaus		Appalachian highlands	
Year	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]
	Sawtimber *Dollars per thousand board feet, Scribner log rule*															
1977	88	140	106	168	104	166	110	175	82	131	—	—	61	98	48	77
1978	107	158	113	167	123	181	142	210	98	145	—	—	79	117	66	97
1979	132	174	137	180	157	206	179	235	120	158	—	—	95	124	74	97
1980	115	132	115	132	125	143	170	195	101	116	—	—	97	111	68	78
1981	128	135	134	141	150	158	186	196	119	126	—	—	88	92	73	77
1982	121	125	129	133	145	150	160	165	114	118	—	—	88	90	62	64
1983	138	141	153	156	162	165	161	164	138	141	—	—	102	104	79	81
1984	133	132	155	154	141	140	159	158	134	133	—	—	110	110	74	74
1985	120	120	142	142	131	131	133	133	120	120	—	—	99	99	70	70
	Veneer timber *Dollars per thousand board feet, Scribner log rule*															
1977	112	179	121	193	118	188	113	179	105	168	—	—	104	165	—	—
1978	133	196	137	203	137	202	147	217	121	178	—	—	140	207	—	—
1979	163	213	158	207	170	223	193	253	142	186	—	—	167	219	—	—
1980	146	168	136	156	140	161	184	211	126	144	—	—	158	182	—	—
1981	164	172	155	163	164	172	197	207	145	152	—	—	142	149	—	—
1982	155	160	144	149	168	174	173	178	140	144	—	—	118	122	—	—
1983	172	175	167	171	189	192	175	179	160	163	—	—	163	166	—	—
1984	166	165	166	165	182	181	170	169	152	152	—	—	160	159	—	—
1985	154	154	156	156	168	168	147	147	146	146	—	—	150	150	—	—
	Pulpwood *Dollars per standard cord*															
1977	9.14	14.54	10.83	17.21	15.22	24.19	7.00	11.13	8.25	13.11	—	—	5.56	8.83	5.15	8.19
1978	10.07	14.85	11.14	16.42	16.91	24.94	8.16	12.04	8.99	13.26	—	—	6.27	9.24	5.53	8.16
1979	10.49	13.75	10.11	13.26	17.72	23.22	9.05	11.87	9.45	12.39	—	—	6.61	8.67	5.81	7.61
1980	11.24	12.91	10.33	11.87	19.29	22.16	9.40	10.80	10.50	12.06	—	—	7.01	8.06	6.13	7.04
1981	11.99	12.62	10.85	11.41	20.88	21.97	10.56	11.11	11.16	11.74	—	—	7.40	7.79	6.10	6.41
1982	14.02	14.47	12.44	12.84	22.59	23.31	14.60	15.07	12.47	12.87	—	—	9.66	9.97	5.91	6.10
1983	14.33	14.61	13.47	13.72	21.21	21.61	15.66	15.95	13.04	13.29	—	—	9.92	10.10	6.88	7.01
1984	14.69	14.62	14.12	14.05	19.82	19.72	17.17	17.08	13.40	13.33	—	—	10.19	10.14	7.38	7.35
1985	14.53	14.53	13.76	13.76	18.76	18.76	16.64	16.64	13.83	13.83	—	—	9.80	9.80	8.35	8.35

[1] See accompanying figure for areas included in price regions.

[2] Derived by dividing the price in current dollars by the Bureau of Labor Statistics producer price index for all commodities (1985 = 100) .

Source: Prices are based on average annual stumpage prices reported by Timber Mart–South.



Southern Timber Price Regions

Table 2.34—Average mixed hardwood[1] stumpage prices for sawtimber, veneer timber, and pulpwood in the South, by region[2] and product, 1977–85

Year	South		Northern coastal plain		East Gulf coastal plain		West Gulf coastal plain		Piedmont and uplands		Mississippi delta		Central plateaus		Appalachian highlands	
	Current dollars	1985 dollars[3]	Current dollars	1985 dollars[3]	Current dollars	1985 dollars[3]	Current dollars	1985 dollars[3]	Current dollars	1985 dollars[3]	Current dollars	1985 dollars[3]	Current dollars	1985 dollars[3]	Current dollars	1985 dollars[3]
Sawtimber *Dollars per thousand board feet, Doyle log rule*																
1977	47	75	56	89	44	69	43	68	44	70	58	93	57	91	42	67
1978	55	82	59	87	48	71	50	74	54	79	69	102	65	95	57	84
1979	59	78	60	79	55	72	56	73	58	76	70	92	66	87	58	76
1980	54	62	50	58	52	60	55	64	53	61	65	75	57	66	52	60
1981	55	58	48	51	58	61	55	58	52	55	69	73	54	56	51	54
1982	51	53	49	51	52	54	50	52	48	50	64	66	49	51	48	50
1983	55	56	50	51	51	52	55	56	52	53	66	67	62	63	55	56
1984	58	57	49	48	54	54	52	52	54	54	64	63	73	73	64	64
1985	63	63	53	53	66	66	—	—	58	58	—	—	81	81	63	63
Veneer timber *Dollars per thousand board feet, Doyle log rule*																
1977	94	149	89	141	54	86	89	141	70	112	103	164	227	361	131	208
1978	96	142	94	139	72	107	96	142	84	123	128	189	120	178	128	189
1979	105	137	109	143	84	110	107	141	96	125	130	170	122	159	122	160
1980	102	118	105	120	84	96	113	129	95	109	133	153	117	134	103	118
1981	114	119	88	93	103	108	129	136	91	95	173	181	109	115	96	101
1982	112	116	—	—	94	97	136	140	111	115	147	152	120	124	111	115
1983	100	102	123	125	92	94	131	133	89	91	122	124	117	119	108	110
1984	126	125	78	77	115	115	121	120	125	124	137	136	132	132	138	138
1985	145	145	—	—	127	127	—	—	148	148	—	—	166	166	152	152
Pulpwood *Dollars per standard cord*																
1977	2.83	4.49	3.01	4.78	3.26	5.19	2.36	3.76	3.09	4.91	3.17	5.05	1.79	2.85	2.50	3.97
1978	2.94	4.34	3.17	4.67	3.25	4.80	2.77	4.08	2.98	4.40	3.50	5.16	1.99	2.93	2.67	3.94
1979	3.01	3.95	2.79	3.66	3.64	4.77	2.97	3.89	2.97	3.90	3.60	4.72	2.03	2.66	2.56	3.35
1980	3.04	3.50	2.93	3.37	3.13	3.60	3.25	3.73	3.21	3.69	3.72	4.28	2.37	2.73	2.44	2.81
1981	3.52	3.71	3.61	3.80	3.70	3.90	3.59	3.78	3.82	4.02	3.88	4.08	2.94	3.09	2.69	2.83
1982	3.54	3.65	3.47	3.58	3.58	3.69	3.97	4.10	3.71	3.83	4.10	4.23	2.90	3.00	2.76	2.85
1983	3.77	3.84	3.09	3.15	4.14	4.22	4.18	4.25	3.92	4.00	4.26	4.34	2.75	2.80	3.12	3.18
1984	3.73	3.71	2.81	2.79	4.21	4.19	4.11	4.09	3.66	3.65	4.35	4.32	2.76	2.75	3.51	3.49
1985	3.42	3.42	2.83	2.83	3.56	3.56	3.66	3.66	3.45	3.45	4.06	4.06	2.72	2.72	3.42	3.42

[1] Mixed hardwoods include ash, beech, cottonwood, willow, elm, gums, locust, hackberry, magnolia, maples, pecan, hickory, sassafras, sycamore, tupelo, and birch.

[2] See figure accompanying appendix table 2.33 for areas included in price regions.

[3] Derived by dividing the price in current dollars by the Bureau of Labor Statistics producer price index for all commodities (1985 = 100).

Source: Prices are based on average annual stumpage prices reported by Timber Mart-South.

Table 2.35—Average select hardwood[1] stumpage prices for sawtimber and veneer timber in the South, by region[2] and product, 1977–85

Year	South		Northern coastal plain		East Gulf coastal plain		West Gulf coastal plain		Piedmont and uplands		Mississippi delta		Central plateaus		Appalachian highlands	
	Current dollars	1985 dollars[3]	Current dollars	1985 dollars[3]	Current dollars	1985 dollars[3]	Current dollars	1985 dollars[3]	Current dollars	1985 dollars[3]	Current dollars	1985 dollars[3]	Current dollars	1985 dollars[3]	Current dollars	1985 dollars[3]
	Sawtimber *Dollars per thousand board feet, Doyle log rule*															
1977	230	366	163	259	143	227	154	245	216	343	169	269	230	366	378	601
1978	288	425	247	365	160	236	200	295	300	443	223	329	273	402	377	556
1979	442	579	225	295	180	236	—	—	373	489	417	547	690	905	495	650
1980	579	665	—	—	196	225	—	—	535	615	863	991	780	896	473	544
1981	486	511	—	—	110	116	613	644	522	549	533	560	452	475	442	465
1982	373	385	—	—	—	—	475	490	475	490	369	381	336	347	270	278
1983	334	340	—	—	—	—	331	337	373	380	321	327	290	295	338	344
1984	293	292	—	—	—	—	281	280	311	310	314	312	263	261	305	304
1985	274	274	—	—	—	—	—	—	271	271	325	325	268	268	276	276
	Veneer timber *Dollars per thousand board feet, Doyle log rule*															
1977	478	759	171	272	177	281	450	716	359	571	254	404	789	1,255	684	1,088
1978	614	906	380	561	270	398	588	867	460	678	322	475	968	1,428	927	1,367
1979	707	927	683	896	—	—	505	662	566	742	498	653	994	1,304	916	1,200
1980	809	929	933	1,072	—	—	600	689	740	851	783	900	778	894	1,011	1,162
1981	771	811	—	—	450	473	800	842	852	896	629	662	610	642	867	912
1982	499	515	675	697	—	—	575	593	550	568	718	741	409	422	420	433
1983	661	674	—	—	—	—	—	—	621	632	250	255	683	696	722	736
1984	715	711	—	—	—	—	675	672	682	679	571	568	701	697	813	809
1985	876	876	—	—	—	—	510	510	795	795	800	800	950	950	948	948

[1] Select hardwoods include walnut, cherry, chestnut, and some prime grades of cypress, northern red oak, cherrybark oak, and white oak.

[2] See figure accompanying appendix table 2.33 for areas included in price regions.

[3] Derived by dividing the price in current dollars by the Bureau of Labor Statistics producer price index for all commodities (1985 = 100).

Source: Prices are based on average annual stumpage prices for select hardwoods reported by Timber Mart-South.

Table 2.36—Average pine stumpage prices[1] for pulpwood sold from national forests in the South, by State for selected years 1950–85

Year	South		Alabama		Arkansas		Florida		Georgia		Louisiana	
	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]
	Dollars per standard cord											
1950	3.68	13.09	3.03	10.83	2.28	8.05	2.79	9.82	2.53	8.95	4.17	14.86
1955	6.71	22.87	6.96	23.68	4.25	14.53	7.68	26.15	4.19	14.23	5.92	20.15
1960	9.86	32.09	10.08	32.79	4.98	16.22	13.36	43.46	9.60	31.24	8.27	26.90
1965	9.67	30.64	9.01	28.54	4.76	15.06	13.33	42.15	9.92	31.50	7.01	22.18
1970	10.86	30.37	11.58	32.17	5.84	16.33	17.22	47.87	9.54	27.05	10.25	28.54
1975	13.66	25.24	11.18	21.10	11.11	20.25	29.55	54.78	8.17	14.90	11.68	21.98
1980	21.09	24.56	12.29	14.65	12.55	14.32	36.13	41.57	11.31	13.07	32.75	38.53
1985	26.09	26.16	17.32	17.34	14.07	14.11	53.91	54.05	11.05	11.09	29.27	29.38
	Mississippi		North Carolina		South Carolina		Tennessee		Texas		Virginia	
1950	4.68	16.70	2.77	9.91	4.65	16.57	2.38	8.53	3.46	12.39	—	—
1955	7.83	26.67	3.10	10.57	8.19	28.00	3.70	12.62	5.44	18.60	—	—
1960	10.04	32.67	6.54	21.29	11.53	37.53	6.40	20.82	6.60	21.47	—	—
1965	6.88	21.78	5.68	18.03	12.76	40.36	4.40	13.94	5.24	16.67	4.66	14.36
1970	8.64	24.21	5.04	14.14	12.42	34.73	3.80	10.65	6.64	18.44	5.00	13.91
1975	10.04	18.70	5.94	10.83	13.29	24.83	4.68	8.49	9.09	16.48	6.88	13.41
1980	14.23	16.88	12.75	15.75	18.52	21.76	4.95	5.71	21.71	24.95	4.71	5.51
1985	17.16	17.20	9.55	9.57	20.78	20.84	15.68	15.71	23.37	23.48	7.06	7.05

[1] Prices computed as a 5-year moving average of volume-weighted prices derived from high bids for national forest timber sales.

[2] Derived by dividing the price in current dollars by the Bureau of Labor Statistics producer price index for all commodities (1985 = 100).

Source: U.S. Department of Agriculture, Forest Service.

Table 2.37—Average hardwood stumpage prices[1] for pulpwood sold from national forests in the South, by State for selected years 1950–85

Year	South		Alabama		Arkansas		Florida		Georgia		Louisiana	
	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]	Current dollars	1985 dollars[2]
	Dollars per standard cord											
1957	3.37	11.75	4.39	13.20	2.03	2.94	1.00	—	2.99	8.35	3.92	15.08
1960	2.90	9.44	3.44	11.20	1.68	9.11	0.40	—	2.26	7.36	2.64	8.58
1965	2.62	8.31	2.29	7.26	3.17	10.00	0.76	5.83	2.06	6.55	3.52	11.18
1970	2.53	7.04	1.38	3.85	3.68	10.25	1.71	6.09	1.90	5.28	2.94	8.21
1975	2.60	4.79	1.67	3.02	5.86	10.24	2.39	—	2.75	5.02	3.44	6.48
1980	3.20	3.84	1.57	1.87	3.54	4.06	—	—	2.54	3.09	4.71	5.47
1985	4.16	4.17	2.48	2.49	3.27	3.28	—	—	3.50	3.52	5.51	5.51
	Mississippi		North Carolina		South Carolina		Tennessee		Texas		Virginia	
1957	4.34	13.93	2.65	9.01	2.18	5.94	3.02	12.41	2.00	6.07	—	—
1960	4.23	13.75	2.58	8.38	2.68	8.73	2.66	8.66	2.83	9.20	—	—
1965	3.53	11.23	2.54	8.09	2.69	8.50	1.75	5.55	2.95	9.36	2.52	7.77
1970	3.18	8.89	2.28	6.33	2.56	7.17	2.19	6.07	2.40	6.76	2.71	7.53
1975	4.23	7.91	2.31	4.30	3.53	6.54	2.28	4.15	2.67	4.95	2.23	4.15
1980	5.56	6.61	2.54	3.15	5.86	7.18	1.62	1.95	3.72	4.31	3.53	4.20
1985	6.06	6.08	1.71	1.72	4.18	4.20	5.12	5.12	4.59	4.60	6.57	6.59

[1] Prices computed as a 5-year moving average of volume-weighted prices derived from high bids for national forest timber sales.

[2] Derived by dividing the price in current dollars by the Bureau of Labor Statistics producer price index for all commodities (1985 = 100).

Source: U.S. Department of Agriculture, Forest Service.

[This page intentionally left blank.]

Appendix 3

Table 3.1—Area of timberland, by ownership and forest management type in the Southeast region, selected years 1952–85, with projections to 2030[1]

Thousand acres

Ownership and forest management type	Year					Projections				
	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
National forest										
Pine plantations	36	151	205	225	279	362	549	674	765	829
Natural pine	1,547	1,418	1,373	1,381	1,330	1,274	1,154	1,107	1,092	1,089
Mixed pine–hardwoods	338	400	462	482	540	615	776	817	825	816
Upland hardwoods	2,192	2,290	2,345	2,517	2,487	2,439	2,264	2,169	2,101	2,064
Bottomland hardwoods	346	316	247	239	235	225	212	222	231	238
Total	**4,459**	**4,575**	**4,632**	**4,844**	**4,871**	**4,915**	**4,954**	**4,989**	**5,014**	**5,035**
Other public										
Pine plantations	22	133	247	328	487	557	705	799	856	887
Natural pine	1,847	1,972	1,621	1,553	1,488	1,436	1,229	1,110	1,039	997
Mixed pine–hardwoods	323	387	484	471	454	466	518	547	561	567
Upland hardwoods	584	660	831	841	891	877	881	879	874	869
Bottomland hardwoods	740	595	427	487	580	593	555	533	522	516
Total	**3,516**	**3,747**	**3,610**	**3,680**	**3,900**	**3,929**	**3,887**	**3,868**	**3,852**	**3,837**
Forest industry[2]										
Pine plantations	494	2,310	3,978	5,634	8,000	8,885	10,710	11,557	11,929	12,124
Natural pine	7,877	6,317	5,669	4,476	3,295	2,827	1,838	1,373	1,285	1,272
Mixed pine–hardwoods	1,145	1,526	1,828	1,673	1,437	1,291	1,034	966	966	952
Upland hardwoods	1,871	2,322	2,358	2,251	2,259	2,215	2,029	1,891	1,827	1,792
Bottomland hardwoods	3,644	3,507	3,257	3,269	3,717	3,680	3,392	3,161	3,004	2,889
Total	**15,031**	**15,982**	**17,090**	**17,303**	**18,708**	**18,897**	**19,003**	**18,948**	**19,010**	**19,028**
Other private:										
Farmer										
Pine plantations	(3)	(3)	(3)	996	1,037	1,251	1,736	2,044	2,257	2,406
Natural pine	(3)	(3)	(3)	7,798	4,996	4,147	2,805	2,219	1,997	1,933
Mixed pine–hardwoods	(3)	(3)	(3)	3,884	2,464	2,283	2,023	1,895	1,809	1,769
Upland hardwoods	(3)	(3)	(3)	10,907	7,899	7,129	6,209	6,034	5,955	5,821
Bottomland hardwoods	(3)	(3)	(3)	4,417	3,404	2,714	2,090	1,897	1,802	1,738
Total	(3)	(3)	(3)	28,002	19,800	17,525	14,864	14,089	13,820	13,668
Corporate										
Pine plantations	(3)	(3)	(3)	776	909	1,198	1,872	2,262	2,425	2,504
Natural pine	(3)	(3)	(3)	2,275	2,519	2,532	2,143	1,903	1,802	1,789
Mixed pine–hardwoods	(3)	(3)	(3)	805	955	1,106	1,332	1,408	1,440	1,466
Upland hardwoods	(3)	(3)	(3)	1,973	2,620	2,853	3,198	3,457	3,575	3,625
Bottomland hardwoods	(3)	(3)	(3)	1,556	1,894	2,074	2,152	2,218	2,268	2,282
Total	(3)	(3)	(3)	7,385	8,897	9,763	10,696	11,248	11,511	11,666

Table 3.1—Area of timberland, by ownership and forest management type in the Southeast region, selected years 1952–85, with projections to 2030[1]—Continued

Thousand acres

Ownership and forest management type	Year					Projections				
	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
Other individual										
Pine plantations	(3)	(3)	(3)	1,544	1,877	2,397	3,644	4,256	4,386	4,400
Natural pine	(3)	(3)	(3)	8,475	7,806	7,173	5,507	4,567	4,090	3,887
Mixed pine–hardwoods	(3)	(3)	(3)	3,544	3,768	3,965	4,434	4,444	4,326	4,225
Upland hardwoods	(3)	(3)	(3)	9,589	11,325	10,905	11,022	11,079	10,944	10,722
Bottomland hardwoods	(3)	(3)	(3)	3,453	3,944	4,106	4,214	4,238	4,189	4,100
Total	(3)	(3)	(3)	26,605	28,720	28,546	28,822	28,583	27,933	27,335
Total other private										
Pine plantations	471	1,857	3,224	3,316	3,823	4,846	7,252	8,562	9,068	9,310
Natural pine	31,727	25,415	21,353	18,548	15,321	13,852	10,455	8,689	7,889	7,609
Mixed pine–hardwoods	5,369	7,856	8,473	8,233	7,187	7,354	7,789	7,747	7,575	7,460
Upland hardwoods	17,124	20,509	21,902	22,469	21,844	20,887	20,429	20,570	20,474	20,168
Bottomland hardwoods	11,370	11,099	9,513	9,426	9,242	8,894	8,456	8,353	8,259	8,120
Total	**66,061**	**66,736**	**64,465**	**61,992**	**57,417**	**55,833**	**54,381**	**53,921**	**53,265**	**52,667**
Total, all ownerships										
Pine plantations	1,023	4,451	7,654	9,503	12,589	14,650	19,216	21,592	22,618	23,150
Natural pine	42,998	35,122	30,016	25,958	21,434	19,389	14,676	12,279	11,305	10,967
Mixed pine–hardwoods	7,175	10,169	11,247	10,859	9,618	9,726	10,117	10,077	9,927	9,795
Upland hardwoods	21,771	25,781	27,439	28,078	27,481	26,418	25,603	25,509	25,276	24,893
Bottomland hardwoods	16,100	15,517	13,441	13,421	13,774	13,392	12,615	12,269	12,016	11,763
Total	**89,067**	**91,040**	**89,797**	**87,819**	**84,896**	**83,574**	**82,225**	**81,726**	**81,141**	**80,567**

[1] Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, 1985, and the projection years are as of January 1.

[2] Includes timberland leased or under management contracts to forest industry from other owners for periods of one forest rotation or longer. Timberland under cutting contracts is not included.

[3] Data for these other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.2—Area of timberland, by ownership and forest management type in the South Central region, selected years 1952–85, with projections to 2030[1]

Thousand acres

Ownership and forest management type	Year					Projections				
	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
National forest										
Pine plantations	203	317	268	225	304	402	644	788	886	959
Natural pine	2,218	2,426	2,505	2,433	2,130	1,985	1,673	1,587	1,564	1,548
Mixed pine–hardwoods	1,198	1,130	1,189	1,258	1,301	1,406	1,561	1,573	1,562	1,545
Upland hardwoods	1,929	1,968	1,899	1,929	1,943	1,915	1,883	1,847	1,822	1,802
Bottomland hardwoods	362	296	242	221	224	211	191	182	178	173
Total	**5,910**	**6,137**	**6,103**	**6,066**	**5,902**	**5,919**	**5,952**	**5,977**	**6,012**	**6,027**
Other public										
Pine plantations	75	119	94	79	93	117	174	216	245	271
Natural pine	516	503	619	545	481	525	521	521	527	531
Mixed pine–hardwoods	631	487	488	459	501	488	552	575	587	596
Upland hardwoods	997	951	1,064	1,003	1,045	1,047	1,028	1,031	1,033	1,038
Bottomland hardwoods	856	863	1,012	1,059	1,223	1,262	1,296	1,323	1,334	1,348
Total	**3,075**	**2,923**	**3,277**	**3,145**	**3,343**	**3,439**	**3,569**	**3,666**	**3,726**	**3,785**
Forest industry[2]										
Pine plantations	166	817	1,736	3,089	5,153	7,154	11,633	13,474	14,340	14,848
Natural pine	6,699	7,329	7,688	6,864	5,523	4,737	2,775	2,196	2,029	1,980
Mixed pine–hardwoods	3,810	3,644	4,514	4,722	4,588	3,605	2,196	1,826	1,743	1,696
Upland hardwoods	3,943	4,147	3,871	4,404	4,859	4,650	3,993	3,514	3,235	3,067
Bottomland hardwoods	3,735	3,879	3,517	3,727	3,431	3,512	3,326	3,090	2,897	2,759
Total	**18,353**	**19,816**	**21,326**	**22,806**	**23,555**	**23,658**	**23,923**	**24,100**	**24,244**	**24,350**
Other private:										
Farmer										
Pine plantations	([3])	([3])	([3])	782	682	989	1,655	1,951	2,080	2,135
Natural pine	([3])	([3])	([3])	4,041	3,021	3,041	2,832	2,595	2,414	2,264
Mixed pine–hardwoods	([3])	([3])	([3])	3,701	3,007	2,537	1,935	1,698	1,493	1,360
Upland hardwoods	([3])	([3])	([3])	10,366	9,843	8,891	7,562	6,626	5,902	5,479
Bottomland hardwoods	([3])	([3])	([3])	3,980	3,339	3,165	2,818	2,525	2,284	2,083
Total	([3])	([3])	([3])	22,870	19,892	18,622	16,801	15,395	14,173	13,322
Corporate										
Pine plantations	([3])	([3])	([3])	312	484	730	1,372	1,787	2,081	2,276
Natural pine	([3])	([3])	([3])	1,372	1,329	1,445	1,350	1,316	1,334	1,360
Mixed pine–hardwoods	([3])	([3])	([3])	966	1,006	976	960	1,007	1,034	1,051
Upland hardwoods	([3])	([3])	([3])	1,949	2,401	2,638	3,009	3,304	3,552	3,766
Bottomland hardwoods	([3])	([3])	([3])	1,900	2,058	2,079	2,092	2,135	2,174	2,187
Total	([3])	([3])	([3])	6,499	7,278	7,868	8,783	9,548	10,176	10,640

Table 3.2—Area of timberland, by ownership and forest management type in the Southeast region, selected years 1952–85, with projections to 2030[1]—Continued

Thousand acres

Ownership and forest management type	Year					Projections				
	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
Other individual										
Pine plantations	([3])	([3])	([3])	1,433	1,579	2,267	3,723	4,386	4,693	4,819
Natural pine	([3])	([3])	([3])	8,027	7,047	6,946	5,767	5,108	4,744	4,585
Mixed pine–hardwoods	([3])	([3])	([3])	6,880	6,887	6,051	5,349	5,155	4,969	4,840
Upland hardwoods	([3])	([3])	([3])	14,416	15,642	15,425	15,243	15,042	14,950	14,751
Bottomland hardwoods	([3])	([3])	([3])	6,553	6,143	6,237	6,306	6,124	5,965	5,843
Total	([3])	([3])	([3])	37,309	37,298	36,926	36,388	35,815	35,321	34,838
Total other private										
Pine plantations	379	1,883	2,392	2,527	2,745	3,986	6,750	8,124	8,854	9,230
Natural pine	19,556	19,528	15,864	13,440	11,397	11,432	9,949	9,019	8,492	8,209
Mixed pine–hardwoods	14,274	12,071	11,747	11,547	10,900	9,564	8,244	7,860	7,496	7,251
Upland hardwoods	26,742	28,255	27,286	26,731	27,886	26,954	25,814	24,972	24,404	23,996
Bottomland hardwoods	15,694	15,398	13,520	12,433	11,540	11,481	11,216	10,784	10,423	10,113
Total	**76,645**	**77,135**	**70,809**	**66,678**	**64,468**	**63,416**	**61,972**	**60,758**	**59,670**	**58,800**
Total, all ownerships										
Pine plantations	823	3,136	4,490	5,920	8,295	11,659	19,201	22,602	24,325	25,308
Natural pine	28,989	29,786	26,676	23,282	19,532	18,679	14,918	13,323	12,612	12,268
Mixed pine–hardwoods	19,913	17,332	17,938	17,986	17,290	15,063	12,553	11,834	11,388	11,088
Upland hardwoods	33,611	35,321	34,120	34,067	35,733	34,566	32,718	31,364	30,494	29,903
Bottomland hardwoods	20,647	20,436	18,291	17,440	16,418	16,466	16,029	15,379	14,832	14,393
Total	**103,983**	**106,011**	**101,515**	**98,695**	**97,268**	**96,432**	**95,416**	**94,501**	**93,652**	**92,960**

[1] Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, 1985, and the projection years are as of January 1.

[2] Includes timberland leased or under management contracts to forest industry from other owners for periods of one forest rotation or longer. Timberland under cutting contracts is not included.

[3] Data for these other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.3—Area of timberland, by ownership and forest management type in Alabama, selected years 1952–85, with projections to 2030[1]

Thousand acres

Ownership and forest management type	Year					Projections				
	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
National forest										
Pine plantations	24	40	28	17	20	38	82	111	134	152
Natural pine	209	251	228	249	194	183	131	112	103	97
Mixed pine–hardwoods	202	166	178	206	178	167	172	163	155	149
Upland hardwoods	176	169	191	181	154	162	170	174	173	170
Bottomland hardwoods	5	5	5	6	5	4	3	3	3	3
Total	**616**	**631**	**630**	**659**	**551**	**554**	**558**	**563**	**567**	**571**
Other public										
Pine plantations	16	21	17	14	18	21	28	33	37	42
Natural pine	108	141	134	106	82	92	90	88	89	90
Mixed pine–hardwoods	99	83	93	101	104	102	113	113	114	114
Upland hardwoods	96	94	110	132	160	161	155	147	143	140
Bottomland hardwoods	33	32	37	79	108	114	113	106	102	98
Total	**352**	**371**	**391**	**432**	**472**	**490**	**498**	**487**	**486**	**485**
Forest industry[2]										
Pine plantations	31	226	379	791	1,373	1,804	2,774	3,218	3,439	3,562
Natural pine	1,229	1,872	1,712	1,426	1,174	1,044	663	503	443	420
Mixed pine–hardwoods	1,035	1,055	1,193	1,120	1,024	791	476	404	388	379
Upland hardwoods	631	755	896	1,022	1,031	992	896	815	769	741
Bottomland hardwoods	314	370	435	497	533	580	569	543	522	505
Total	**3,240**	**4,278**	**4,615**	**4,856**	**5,135**	**5,212**	**5,379**	**5,484**	**5,560**	**5,606**
Other private:										
Farmer										
Pine plantations	(3)	(3)	(3)	310	288	412	707	878	975	1,010
Natural pine	(3)	(3)	(3)	1,486	1,096	1,160	1,172	1,118	1,063	993
Mixed pine–hardwoods	(3)	(3)	(3)	1,238	1,038	903	723	637	553	486
Upland hardwoods	(3)	(3)	(3)	2,228	2,444	2,305	1,976	1,753	1,588	1,412
Bottomland hardwoods	(3)	(3)	(3)	928	901	873	874	813	740	661
Total	(3)	(3)	(3)	6,190	5,767	5,654	5,452	5,198	4,920	4,563
Corporate										
Pine plantations	(3)	(3)	(3)	110	150	210	364	470	552	610
Natural pine	(3)	(3)	(3)	537	416	443	409	391	386	382
Mixed pine–hardwoods	(3)	(3)	(3)	428	366	322	290	296	304	309
Upland hardwoods	(3)	(3)	(3)	486	650	704	804	881	956	[illegible]
Bottomland hardwoods	(3)	(3)	(3)	118	83	101	121	139	150	[illegible]
Total	(3)	(3)	(3)	1,679	1,665	1,780	1,989	2,177	2,348	2,457

Table 3.3—Area of timberland, by ownership and forest management type in Alabama, selected years 1952–85, with projections to 2030[1]—Continued

Thousand acres

Ownership and forest management type	Year 1952	1962	1970	1977	1985	Projections 1990	2000	2010	2020	2030
Other individual										
Pine plantations	(3)	(3)	(3)	398	516	664	992	1,147	1,222	1,243
Natural pine	(3)	(3)	(3)	2,160	1,955	1,951	1,612	1,402	1,291	1,236
Mixed pine–hardwoods	(3)	(3)	(3)	1,700	1,673	1,379	1,139	1,084	1,045	1,015
Upland hardwoods	(3)	(3)	(3)	2,553	3,043	3,134	3,270	3,282	3,287	3,267
Bottomland hardwoods	(3)	(3)	(3)	871	800	818	837	834	841	834
Total	(3)	(3)	(3)	7,682	7,987	7,946	7,849	7,749	7,685	7,596
Total other private										
Pine plantations	94	527	779	818	954	1,286	2,063	2,495	2,749	2,863
Natural pine	5,126	6,063	4,881	4,183	3,467	3,554	3,193	2,911	2,740	2,611
Mixed pine–hardwoods	4,467	3,535	3,518	3,366	3,077	2,604	2,152	2,017	1,902	1,810
Upland hardwoods	4,719	4,379	4,576	5,267	6,137	6,143	6,050	5,916	5,831	5,678
Bottomland hardwoods	2,143	1,959	2,028	1,917	1,784	1,792	1,832	1,786	1,731	1,652
Total	**16,549**	**16,463**	**15,782**	**15,551**	**15,419**	**15,380**	**15,290**	**15,124**	**14,953**	**14,616**
Total, all ownerships										
Pine plantations	165	814	1,203	1,640	2,365	3,149	4,947	5,857	6,359	6,619
Natural pine	6,672	8,327	6,955	5,964	4,917	4,873	4,077	3,614	3,375	3,218
Mixed pine–hardwoods	5,803	4,839	4,982	4,793	4,383	3,664	2,913	2,697	2,559	2,452
Upland hardwoods	5,622	5,397	5,773	6,602	7,482	7,458	7,271	7,052	6,916	6,729
Bottomland hardwoods	2,495	2,366	2,505	2,499	2,430	2,490	2,517	2,438	2,358	2,258
Total	**20,757**	**21,743**	**21,418**	**21,498**	**21,577**	**721,636**	**21,725**	**21,658**	**21,566**	**21,278**

[1] Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, 1985, and the projection years are as of January 1.

[2] Includes timberland leased or under management contracts to forest industry from other owners for periods of one forest rotation or longer. Timberland under cutting contracts is not included.

[3] Data for these other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.4—Area of timberland, by ownership and forest management type in Arkansas, selected years 1952–85, with projections to 2030[1]

Thousand acres

Ownership and forest management type	Year					Projections				
	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
National forest										
Pine plantations	8	24	10	17	26	38	71	89	100	107
Natural pine	816	863	826	759	734	688	652	658	670	677
Mixed pine–hardwoods	351	427	479	458	500	588	653	673	680	683
Upland hardwoods	1,102	1,056	1,048	1,110	1,098	1,049	999	963	942	932
Bottomland hardwoods	15	15	15	6	6	4	3	3	3	3
Total	**2,292**	**2,385**	**2,378**	**2,350**	**2,364**	**2,368**	**2,378**	**2,386**	**2,394**	**2,402**
Other public										
Pine plantations	2	5	2	5	7	15	31	45	54	63
Natural pine	26	16	16	28	26	34	42	54	64	72
Mixed pine–hardwoods	77	41	56	37	39	50	72	90	100	109
Upland hardwoods	225	115	193	169	163	175	195	215	225	234
Bottomland hardwoods	294	294	294	329	332	345	366	395	407	421
Total	**624**	**471**	**561**	**568**	**567**	**619**	**706**	**800**	**850**	**900**
Forest industry[2]										
Pine plantations	21	57	110	186	681	1,121	2,088	2,447	2,602	2,693
Natural pine	1,693	1,631	1,554	1,613	1,392	1,174	648	533	513	509
Mixed pine–hardwoods	617	650	912	912	909	710	433	352	336	330
Upland hardwoods	1,114	951	609	667	603	626	587	510	457	427
Bottomland hardwoods	733	733	800	784	780	732	623	550	499	465
Total	**4,178**	**4,022**	**3,985**	**4,162**	**4,365**	**4,363**	**4,379**	**4,391**	**4,406**	**4,424**
Other private:										
Farmer										
Pine plantations	([3])	([3])	([3])	63	42	61	82	101	112	122
Natural pine	([3])	([3])	([3])	412	270	218	119	106	104	106
Mixed pine–hardwoods	([3])	([3])	([3])	443	291	201	118	109	107	107
Upland hardwoods	([3])	([3])	([3])	1,583	1,039	777	487	464	463	471
Bottomland hardwoods	([3])	([3])	([3])	665	436	377	247	233	229	229
Total	([3])	([3])	([3])	3,166	2,078	1,634	1,052	1,013	1,015	1,035
Corporate										
Pine plantations	([3])	([3])	([3])	7	38	53	114	145	167	177
Natural pine	([3])	([3])	([3])	122	134	151	126	115	110	109
Mixed pine–hardwoods	([3])	([3])	([3])	94	102	105	102	103	101	103
Upland hardwoods	([3])	([3])	([3])	316	316	341	397	413	420	437
Bottomland hardwoods	([3])	([3])	([3])	180	197	273	340	347	339	[illegible]
Total	([3])	([3])	([3])	719	787	922	1,079	1,123	1,137	1,160

Table 3.4—Area of timberland, by ownership and forest management type in Arkansas, selected years 1952–85, with projections to 2030[1]—Continued

Thousand acres

Ownership and forest management type	Year					Projections				
	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
Other individual										
Pine plantations	([3])	([3])	([3])	137	196	297	491	521	502	485
Natural pine	([3])	([3])	([3])	948	821	797	602	483	411	379
Mixed pine–hardwoods	([3])	([3])	([3])	1,012	1,085	954	809	732	666	627
Upland hardwoods	([3])	([3])	([3])	2,846	2,751	2,543	2,411	2,290	2,190	2,144
Bottomland hardwoods	([3])	([3])	([3])	885	936	1,044	1,084	1,009	935	895
Total	([3])	([3])	([3])	5,828	5,789	5,635	5,396	5,035	4,704	4,530
Total other private										
Pine plantations	24	75	134	207	276	411	687	767	781	784
Natural pine	1,946	2,180	1,784	1,482	1,225	1,166	847	704	625	594
Mixed pine–hardwoods	1,136	1,549	1,423	1,549	1,478	1,260	1,029	944	874	837
Upland hardwoods	6,059	6,229	5,929	4,745	4,106	3,661	3,295	3,167	3,073	3,052
Bottomland hardwoods	3,368	3,060	1,838	1,730	1,569	1,694	1,671	1,589	1,503	1,457
Total	**12,533**	**13,093**	**11,108**	**9,713**	**8,654**	**8,191**	**7,527**	**7,171**	**6,856**	**6,725**
Total, all ownerships										
Pine plantations	55	161	256	415	990	1,585	2,877	3,348	3,537	3,647
Natural pine	4,481	4,690	4,180	3,882	3,377	3,062	2,189	1,949	1,872	1,852
Mixed pine–hardwoods	2,181	2,667	2,870	2,956	2,926	2,608	2,187	2,059	1,990	1,959
Upland hardwoods	8,500	8,351	7,779	6,691	5,970	5,511	5,076	4,855	4,697	4,645
Bottomland hardwoods	4,410	4,102	2,947	2,849	2,687	2,775	2,663	2,537	2,412	2,346
Total	**19,627**	**19,971**	**18,032**	**16,793**	**15,950**	**15,541**	**14,990**	**14,748**	**14,506**	**14,451**

[1] Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, 1985, and the projection years are as of January 1.

[2] Includes timberland leased or under management contracts to forest industry from other owners for periods of one forest rotation or longer. Timberland under cutting contracts is not included.

[3] Data for these other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.5—Area of timberland, by ownership and forest management type in Florida, selected years 1952–85, with projections to 2030[1]

Thousand acres

Ownership and forest management type	Year					Projections				
	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
National forest										
Pine plantations	10	79	109	139	149	177	236	259	270	273
Natural pine	737	664	654	620	612	559	447	390	362	349
Mixed pine–hardwoods	39	40	87	69	62	90	159	174	178	179
Upland hardwoods	16	17	16	28	33	41	42	51	55	58
Bottomland hardwoods	233	230	169	149	137	129	117	126	134	141
Total	**1,035**	**1,030**	**1,035**	**1,005**	**993**	**996**	**1,000**	**1,000**	**1,000**	**1,000**
Other public										
Pine plantations	10	66	127	142	184	211	260	295	317	327
Natural pine	643	574	371	432	423	442	430	421	416	416
Mixed pine–hardwoods	98	96	196	164	150	145	136	132	131	132
Upland hardwoods	236	247	233	185	165	163	159	150	143	136
Bottomland hardwoods	229	207	183	230	250	259	231	213	201	193
Total	**1,216**	**1,190**	**1,110**	**1,153**	**1,172**	**1,220**	**1,216**	**1,212**	**1,207**	**1,203**
Forest industry[2]										
Pine plantations	125	897	1,437	1,901	2,432	2,710	3,194	3,423	3,500	3,537
Natural pine	2,533	2,059	1,620	1,349	1,027	890	605	471	437	427
Mixed pine–hardwoods	222	246	487	392	298	256	203	186	182	178
Upland hardwoods	366	383	362	326	286	296	254	236	226	219
Bottomland hardwoods	1,214	1,374	1,402	1,430	1,459	1,435	1,334	1,232	1,146	1,081
Total	**4,460**	**4,959**	**5,308**	**5,398**	**5,502**	**5,587**	**5,590**	**5,548**	**5,491**	**5,443**
Other private:										
Farmer										
Pine plantations	([3])	([3])	([3])	151	104	93	115	132	128	128
Natural pine	([3])	([3])	([3])	501	300	219	170	149	127	120
Mixed pine–hardwoods	([3])	([3])	([3])	253	177	157	126	122	108	104
Upland hardwoods	([3])	([3])	([3])	583	391	300	289	284	254	242
Bottomland hardwoods	([3])	([3])	([3])	742	492	362	289	268	235	221
Total	([3])	([3])	([3])	2,230	1,464	1,133	988	956	852	814
Corporate										
Pine plantations	([3])	([3])	([3])	465	442	546	775	897	936	946
Natural pine	([3])	([3])	([3])	822	933	939	832	748	699	677
Mixed pine–hardwoods	([3])	([3])	([3])	203	253	279	326	334	331	331
Upland hardwoods	([3])	([3])	([3])	133	445	470	528	552	553	[illegible]
Bottomland hardwoods	([3])	([3])	([3])	929	1,098	1,082	949	880	853	[illegible]
Total	([3])	([3])	([3])	2,552	3,171	3,315	3,411	3,411	3,371	3,304

Table 3.5—Area of timberland, by ownership and forest management type in Florida, selected years 1952–85, with projections to 2030[1]—Continued

Thousand acres

Ownership and forest management type	Year					Projections				
	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
Other individual										
Pine plantations	([3])	([3])	([3])	293	289	334	432	460	434	400
Natural pine	([3])	([3])	([3])	1,027	739	680	581	505	451	420
Mixed pine–hardwoods	([3])	([3])	([3])	383	417	420	471	465	443	421
Upland hardwoods	([3])	([3])	([3])	965	668	676	739	735	701	659
Bottomland hardwoods	([3])	([3])	([3])	837	922	847	687	593	512	468
Total	([3])	([3])	([3])	3,505	3,035	2,957	2,910	2,758	2,540	2,368
Total other private										
Pine plantations	146	464	972	909	835	973	1,322	1,489	1,498	1,474
Natural pine	6,398	3,614	2,720	2,350	1,972	1,838	1,583	1,402	1,277	1,217
Mixed pine–hardwoods	392	755	788	839	847	856	923	921	882	856
Upland hardwoods	1,834	1,918	1,812	1,681	1,504	1,446	1,556	1,571	1,508	1,445
Bottomland hardwoods	2,654	2,900	2,516	2,508	2,512	2,291	1,925	1,741	1,600	1,496
Total	**11,424**	**9,651**	**8,808**	**8,287**	**7,670**	**7,405**	**7,309**	**7,125**	**6,763**	**6,486**
Total, all ownerships										
Pine plantations	291	1,506	2,645	3,091	3,600	4,071	5,012	5,466	5,585	5,611
Natural pine	10,311	6,911	5,365	4,751	4,034	3,729	3,065	2,684	2,492	2,409
Mixed pine–hardwoods	751	1,137	1,558	1,464	1,357	1,347	1,421	1,413	1,373	1,345
Upland hardwoods	2,452	2,565	2,423	2,220	1,988	1,946	2,011	2,008	1,932	1,858
Bottomland hardwoods	4,330	4,711	4,270	4,317	4,358	4,114	3,607	3,312	3,081	2,911
Total	**18,135**	**16,830**	**16,261**	**15,843**	**15,337**	**15,208**	**15,115**	**14,885**	**14,461**	**14,132**

[1] Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, 1985, and the projection years are as of January 1.

[2] Includes timberland leased or under management contracts to forest industry from other owners for periods of one forest rotation or longer. Timberland under cutting contracts is not included.

[3] Data for these other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.6—Area of timberland, by ownership and forest management type in Georgia, selected years 1952–85, with projections to 2030[1]

Thousand acres

Ownership and forest management type	Year 1952	1962	1970	1977	1985	Projections 1990	2000	2010	2020	2030
National forest										
Pine plantations	3	16	25	33	51	72	127	171	209	244
Natural pine	151	166	176	195	173	155	98	76	65	59
Mixed pine–hardwoods	94	108	117	127	133	141	167	164	157	147
Upland hardwoods	392	452	485	454	429	421	399	386	372	357
Bottomland hardwoods	3	3	4	4	4	4	6	6	7	6
Total	**643**	**745**	**807**	**813**	**790**	**793**	**798**	**804**	**810**	**814**
Other public										
Pine plantations	3	10	19	31	48	57	83	105	123	138
Natural pine	487	560	459	418	408	390	330	291	262	241
Mixed pine–hardwoods	125	142	115	112	119	112	117	121	122	122
Upland hardwoods	118	134	109	111	123	131	150	159	164	166
Bottomland hardwoods	308	222	91	104	121	118	109	110	112	115
Total	**1,041**	**1,068**	**793**	**776**	**819**	**808**	**788**	**786**	**784**	**782**
Forest industry[2]										
Pine plantations	228	820	1,395	1,990	2,848	3,022	3,444	3,636	3,761	3,838
Natural pine	2,966	1,842	1,628	1,425	996	854	572	433	404	399
Mixed pine–hardwoods	396	663	655	561	469	432	343	313	312	309
Upland hardwoods	442	690	729	768	817	779	743	706	693	687
Bottomland hardwoods	1,109	948	792	858	1,063	1,072	1,011	976	966	961
Total	**5,141**	**4,963**	**5,199**	**5,602**	**6,193**	**6,158**	**6,113**	**6,064**	**6,136**	**6,194**
Other private:										
Farmer										
Pine plantations	([3])	([3])	([3])	369	354	458	670	771	889	977
Natural pine	([3])	([3])	([3])	2,515	1,790	1,516	1,065	806	722	686
Mixed pine–hardwoods	([3])	([3])	([3])	1,021	628	596	523	471	461	458
Upland hardwoods	([3])	([3])	([3])	1,946	1,608	1,481	1,263	1,156	1,145	1,110
Bottomland hardwoods	([3])	([3])	([3])	1,273	976	757	512	398	365	342
Total	([3])	([3])	([3])	7,124	5,356	4,807	4,034	3,602	3,582	3,573
Corporate										
Pine plantations	([3])	([3])	([3])	160	168	212	312	379	408	421
Natural pine	([3])	([3])	([3])	580	611	612	502	427	381	361
Mixed pine–hardwoods	([3])	([3])	([3])	163	148	162	186	197	201	202
Upland hardwoods	([3])	([3])	([3])	258	451	495	586	647	677	685
Bottomland hardwoods	([3])	([3])	([3])	174	197	241	308	360	381	393
Total	([3])	([3])	([3])	1,335	1,575	1,720	1,896	2,011	2,048	2,062

Table 3.6—Area of timberland, by ownership and forest management type in Georgia, selected years 1952–85, with projections to 2030[1]—Continued

Thousand acres

Ownership and forest management type	Year 1952	1962	1970	1977	1985	Projections 1990	2000	2010	2020	2030
Other individual										
Pine plantations	([3])	([3])	([3])	701	801	935	1,287	1,496	1,546	1,551
Natural pine	([3])	([3])	([3])	3,436	2,995	2,754	2,153	1,756	1,514	1,391
Mixed pine–hardwoods	([3])	([3])	([3])	1,318	1,244	1,216	1,274	1,266	1,221	1,182
Upland hardwoods	([3])	([3])	([3])	1,984	2,548	2,516	2,679	2,761	2,716	2,644
Bottomland hardwoods	([3])	([3])	([3])	1,017	1,214	1,343	1,519	1,614	1,636	1,622
Total	([3])	([3])	([3])	8,456	8,802	8,765	8,912	8,893	8,632	8,391
Total other private										
Pine plantations	123	746	1,299	1,230	1,323	1,605	2,269	2,646	2,843	2,949
Natural pine	9,656	9,052	7,592	6,531	5,396	4,882	3,720	2,989	2,617	2,438
Mixed pine–hardwoods	1,651	2,691	2,787	2,502	2,020	1,974	1,983	1,934	1,883	1,842
Upland hardwoods	2,667	3,695	3,907	4,188	4,607	4,492	4,528	4,564	4,538	4,439
Bottomland hardwoods	3,047	3,338	2,718	2,464	2,387	2,341	2,339	2,372	2,382	2,357
Total	**17,144**	**19,522**	**18,303**	**16,915**	**15,733**	**15,292**	**14,842**	**14,506**	**14,262**	**14,026**
Total, all ownerships										
Pine plantations	357	1,592	2,738	3,284	4,270	4,756	5,923	6,558	6,936	7,169
Natural pine	13,260	11,620	9,855	8,569	6,973	6,281	4,720	3,789	3,348	3,137
Mixed pine–hardwoods	2,266	3,604	3,674	3,302	2,741	2,659	2,610	2,532	2,474	2,420
Upland hardwoods	3,619	4,971	5,230	5,521	5,976	5,823	5,820	5,815	5,767	5,649
Bottomland hardwoods	4,467	4,511	3,605	3,430	3,575	3,535	3,465	3,464	3,467	3,439
Total	**23,969**	**26,298**	**25,102**	**24,106**	**23,535**	**23,051**	**22,541**	**22,160**	**21,992**	**21,816**

[1] Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, 1985, and the projection years are as of January 1.

[2] Includes timberland leased or under management contracts to forest industry from other owners for periods of one forest rotation or longer. Timberland under cutting contracts is not included.

[3] Data for these other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.7—Area of timberland, by ownership and forest management type in Louisiana, selected years 1952–85, with projections to 2030[1]

Thousand acres

Ownership and forest management type	Year 1952	1962	1970	1977	1985	Projections 1990	2000	2010	2020	2030
National forest										
Pine plantations	59	87	74	60	80	96	137	163	182	197
Natural pine	159	301	304	306	251	221	149	122	110	103
Mixed pine–hardwoods	107	91	108	120	101	112	136	136	132	128
Upland hardwoods	68	36	38	42	58	62	65	65	65	63
Bottomland hardwoods	142	60	55	53	53	53	60	63	64	63
Total	**535**	**575**	**579**	**581**	**543**	**544**	**547**	**550**	**553**	**553**
Other public										
Pine plantations	3	10	4	5	6	9	17	22	26	30
Natural pine	27	20	104	96	97	98	85	79	77	76
Mixed pine–hardwoods	33	49	38	43	45	44	52	55	57	58
Upland hardwoods	40	19	9	10	24	36	50	58	62	65
Bottomland hardwoods	210	210	288	289	422	427	429	436	443	451
Total	**313**	**308**	**443**	**443**	**594**	**614**	**634**	**651**	**666**	**679**
Forest industry[2]										
Pine plantations	10	190	641	785	898	1,255	2,022	2,304	2,423	2,489
Natural pine	1,085	1,012	1,300	1,290	1,145	966	571	454	418	406
Mixed pine–hardwoods	612	500	645	692	727	554	303	240	226	219
Upland hardwoods	474	415	488	583	799	777	710	648	607	583
Bottomland hardwoods	1,533	1,489	1,017	1,056	756	777	745	714	690	674
Total	**3,714**	**3,606**	**4,091**	**4,406**	**4,325**	**4,329**	**4,351**	**4,360**	**4,365**	**4,372**
Other private:										
Farmer										
Pine plantations	(3)	(3)	(3)	91	36	39	59	72	80	87
Natural pine	(3)	(3)	(3)	414	177	155	149	143	140	140
Mixed pine–hardwoods	(3)	(3)	(3)	323	83	77	81	82	80	78
Upland hardwoods	(3)	(3)	(3)	348	197	169	170	168	167	165
Bottomland hardwoods	(3)	(3)	(3)	542	313	260	246	235	230	226
Total	(3)	(3)	(3)	1,718	806	700	706	701	697	695
Corporate										
Pine plantations	(3)	(3)	(3)	144	144	201	332	407	454	479
Natural pine	(3)	(3)	(3)	411	371	387	364	354	362	375
Mixed pine–hardwoods	(3)	(3)	(3)	136	148	153	157	157	154	151
Upland hardwoods	(3)	(3)	(3)	116	109	140	181	192	196	200
Bottomland hardwoods	(3)	(3)	(3)	1,370	1,467	1,332	1,186	1,159	1,163	1,159
Total	(3)	(3)	(3)	2,177	2,239	2,212	2,219	2,269	2,329	2,364

Table 3.7—Area of timberland, by ownership and forest management type in Louisiana, selected years 1952–85, with projections to 2030[1]—Continued

Thousand acres

Ownership and forest management type	Year					Projections				
	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
Other individual										
Pine plantations	([3])	([3])	([3])	339	311	396	573	647	674	687
Natural pine	([3])	([3])	([3])	1,119	1,442	1,359	1,105	977	901	862
Mixed pine–hardwoods	([3])	([3])	([3])	817	787	769	758	743	716	697
Upland hardwoods	([3])	([3])	([3])	746	1,026	1,206	1,404	1,448	1,453	1,441
Bottomland hardwoods	([3])	([3])	([3])	1,946	1,724	1,529	1,289	1,160	1,085	1,046
Total	([3])	([3])	([3])	4,967	5,290	5,259	5,129	4,976	4,830	4,733
Total other private										
Pine plantations	31	606	555	574	491	636	964	1,126	1,208	1,253
Natural pine	3,354	3,242	2,314	1,944	1,990	1,901	1,618	1,474	1,403	1,377
Mixed pine–hardwoods	1,892	1,602	1,408	1,276	1,018	999	996	982	950	926
Upland hardwoods	1,464	1,330	1,199	1,210	1,332	1,515	1,755	1,808	1,816	1,806
Bottomland hardwoods	4,736	4,767	4,541	3,858	3,504	3,121	2,721	2,554	2,478	2,431
Total	**11,477**	**11,547**	**10,017**	**8,862**	**8,335**	**8,171**	**8,054**	**7,946**	**7,856**	**7,792**
Total, all ownerships										
Pine plantations	103	893	1,274	1,424	1,475	1,996	3,140	3,615	3,839	3,969
Natural pine	4,625	4,575	4,022	3,636	3,483	3,186	2,423	2,129	2,008	1,962
Mixed pine–hardwoods	2,644	2,242	2,199	2,131	1,891	1,709	1,487	1,413	1,365	1,331
Upland hardwoods	2,046	1,800	1,734	1,845	2,213	2,390	2,580	2,579	2,550	2,517
Bottomland hardwoods	6,621	6,526	5,901	5,256	4,735	4,378	3,955	3,767	3,675	3,619
Total	**16,039**	**16,036**	**15,130**	**14,292**	**13,797**	**13,658**	**13,586**	**13,507**	**13,440**	**13,396**

[1] Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, 1985, and the projection years are as of January 1.

[2] Includes timberland leased or under management contracts to forest industry from other owners for periods of one forest rotation or longer. Timberland under cutting contracts is not included.

[3] Data for these other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.8—Area of timberland, by ownership and forest management type in Mississippi, selected years 1952–85, with projections to 2030[1]

Thousand acres

Ownership and forest management type	Year					Projections				
	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
National forest										
Pine plantations	79	123	101	80	99	126	196	241	275	302
Natural pine	436	460	525	519	378	354	266	233	218	208
Mixed pine–hardwoods	288	241	228	252	283	279	311	310	303	296
Upland hardwoods	108	145	133	143	161	173	183	185	182	178
Bottomland hardwoods	125	140	132	129	132	123	104	94	88	84
Total	**1,036**	**1,109**	**1,119**	**1,123**	**1,053**	**1,055**	**1,060**	**1,063**	**1,067**	**1,068**
Other public										
Pine plantations	10	17	24	28	39	42	54	62	69	74
Natural pine	217	197	225	174	141	156	161	156	152	148
Mixed pine–hardwoods	177	124	126	118	148	127	114	108	105	104
Upland hardwoods	68	76	75	69	85	89	94	96	96	96
Bottomland hardwoods	211	197	201	166	191	199	210	211	211	211
Total	**683**	**611**	**651**	**555**	**604**	**613**	**633**	**633**	**633**	**633**
Forest industry[2]										
Pine plantations	78	208	348	482	977	1,235	1,838	2,114	2,254	2,342
Natural pine	851	883	927	843	651	566	339	251	222	213
Mixed pine–hardwoods	670	534	543	689	633	503	305	271	267	261
Upland hardwoods	358	456	450	562	513	495	429	383	357	342
Bottomland hardwoods	564	601	617	719	786	781	713	638	581	543
Total	**2,521**	**2,682**	**2,885**	**3,295**	**3,560**	**3,580**	**3,624**	**3,657**	**3,681**	**3,702**
Other private:										
Farmer										
Pine plantations	([3])	([3])	([3])	243	215	296	489	585	622	625
Natural pine	([3])	([3])	([3])	1,022	905	940	904	820	740	665
Mixed pine–hardwoods	([3])	([3])	([3])	973	862	683	456	387	333	290
Upland hardwoods	([3])	([3])	([3])	1,558	1,379	1,261	1,130	1,003	892	785
Bottomland hardwoods	([3])	([3])	([3])	1,071	948	950	873	779	683	593
Total	([3])	([3])	([3])	4,867	4,309	4,129	3,852	3,574	3,270	2,957
Corporate										
Pine plantations	([3])	([3])	([3])	15	86	125	245	329	395	444
Natural pine	([3])	([3])	([3])	76	130	177	180	187	198	207
Mixed pine–hardwoods	([3])	([3])	([3])	76	130	126	116	125	131	134
Upland hardwoods	([3])	([3])	([3])	125	185	210	217	230	248	266
Bottomland hardwoods	([3])	([3])	([3])	88	120	169	206	223	235	[illegible]
Total	([3])	([3])	([3])	380	651	808	964	1,094	1,207	1,293

Table 3.8—Area of timberland, by ownership and forest management type in Mississippi, selected years 1952–85, with projections to 2030[1]—Continued

Thousand acres

	Year					Projections				
Ownership and forest management type	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
Other individual										
Pine plantations	([3])	([3])	([3])	273	308	445	732	883	961	1,005
Natural pine	([3])	([3])	([3])	1,546	746	812	716	659	623	617
Mixed pine–hardwoods	([3])	([3])	([3])	1,344	1,504	1,199	935	864	828	813
Upland hardwoods	([3])	([3])	([3])	1,783	2,024	1,874	1,729	1,655	1,621	1,601
Bottomland hardwoods	([3])	([3])	([3])	1,339	1,313	1,425	1,549	1,553	1,543	1,533
Total	([3])	([3])	([3])	6,285	5,895	5,754	5,661	5,614	5,576	5,568
Total other private										
Pine plantations	117	297	460	531	609	866	1,466	1,797	1,978	2,074
Natural pine	3,643	3,593	3,489	2,644	1,781	1,929	1,800	1,666	1,561	1,489
Mixed pine–hardwoods	3,174	2,406	2,265	2,393	2,496	2,008	1,507	1,376	1,292	1,237
Upland hardwoods	3,007	3,642	3,334	3,466	3,588	3,345	3,076	2,888	2,761	2,652
Bottomland hardwoods	2,672	2,704	2,572	2,498	2,381	2,544	2,628	2,555	2,461	2,367
Total	**12,613**	**12,642**	**12,120**	**11,532**	**10,855**	**10,691**	**10,477**	**10,282**	**10,053**	**9,818**
Total, all ownerships										
Pine plantations	284	645	933	1,121	1,724	2,269	3,554	4,214	4,576	4,792
Natural pine	5,147	5,133	5,166	4,180	2,951	3,005	2,566	2,306	2,153	2,058
Mixed pine–hardwoods	4,309	3,305	3,162	3,452	3,560	2,917	2,237	2,065	1,967	1,898
Upland hardwoods	3,541	4,319	3,992	4,240	4,347	4,102	3,782	3,552	3,396	3,268
Bottomland hardwoods	3,572	3,642	3,522	3,512	3,490	3,647	3,655	3,498	3,341	3,205
Total	**16,853**	**17,044**	**16,775**	**16,505**	**16,072**	**15,939**	**15,794**	**15,635**	**15,434**	**15,221**

[1] Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, 1985, and the projection years are as of January 1.

[2] Includes timberland leased or under management contracts to forest industry from other owners for periods of one forest rotation or longer. Timberland under cutting contracts is not included.

[3] Data for these other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.9—Area of timberland, by ownership and forest management type in North Carolina, selected years 1952–85, with projections to 2030[1]

Thousand acres

Ownership and forest management type	Year					Projections				
	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
National forest										
Pine plantations	6	8	13	17	23	34	59	79	95	105
Natural pine	190	177	164	157	144	149	178	196	209	218
Mixed pine–hardwoods	71	85	86	96	125	126	107	105	106	105
Upland hardwoods	742	753	763	749	719	704	672	641	618	606
Bottomland hardwoods	11	10	10	10	14	14	18	20	20	20
Total	**1,020**	**1,033**	**1,036**	**1,029**	**1,025**	**1,028**	**1,033**	**1,040**	**1,048**	**1,055**
Other public										
Pine plantations	5	19	32	42	86	105	140	152	153	148
Natural pine	350	443	406	385	331	297	225	186	165	154
Mixed pine–hardwoods	60	71	72	80	84	90	115	132	142	148
Upland hardwoods	74	76	126	155	166	173	187	195	200	204
Bottomland hardwoods	83	78	79	80	138	135	127	123	121	122
Total	**572**	**687**	**715**	**742**	**805**	**800**	**795**	**789**	**782**	**776**
Forest industry[2]										
Pine plantations	22	187	487	768	1,037	1,203	1,526	1,682	1,742	1,777
Natural pine	1,199	1,206	1,320	651	509	428	260	186	173	171
Mixed pine–hardwoods	249	257	263	259	205	174	140	130	129	128
Upland hardwoods	446	416	303	242	259	280	289	279	269	264
Bottomland hardwoods	769	530	452	401	491	473	397	349	320	302
Total	**2,685**	**2,596**	**2,825**	**2,321**	**2,501**	**2,558**	**2,612**	**2,625**	**2,632**	**2,644**
Other private:										
Farmer										
Pine plantations	(3)	(3)	(3)	140	160	224	337	400	431	449
Natural pine	(3)	(3)	(3)	2,158	1,347	1,087	666	507	447	434
Mixed pine–hardwoods	(3)	(3)	(3)	1,093	753	710	704	661	621	599
Upland hardwoods	(3)	(3)	(3)	3,247	2,259	2,103	1,916	1,898	1,875	1,818
Bottomland hardwoods	(3)	(3)	(3)	1,250	991	814	650	600	573	551
Total	(3)	(3)	(3)	7,888	5,510	4,939	4,274	4,066	3,947	3,852
Corporate										
Pine plantations	(3)	(3)	(3)	33	84	141	293	385	431	463
Natural pine	(3)	(3)	(3)	374	457	440	339	286	273	278
Mixed pine–hardwoods	(3)	(3)	(3)	133	273	303	345	363	374	386
Upland hardwoods	(3)	(3)	(3)	495	535	561	625	692	736	766
Bottomland hardwoods	(3)	(3)	(3)	174	303	397	489	531	559	571
Total	(3)	(3)	(3)	1,209	1,652	1,841	2,092	2,257	2,374	2,464

Table 3.9—Area of timberland, by ownership and forest management type in North Carolina, selected years 1952–85, with projections to 2030[1]—Continued

Thousand acres

	Year					Projections				
Ownership and forest management type	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
Other individual										
Pine plantations	([3])	([3])	([3])	120	224	359	674	831	878	902
Natural pine	([3])	([3])	([3])	1,920	1,930	1,723	1,190	937	833	804
Mixed pine–hardwoods	([3])	([3])	([3])	772	824	892	1,001	1,007	983	968
Upland hardwoods	([3])	([3])	([3])	2,657	3,121	3,017	3,104	3,183	3,184	3,162
Bottomland hardwoods	([3])	([3])	([3])	778	766	841	896	892	878	866
Total	([3])	([3])	([3])	6,247	6,865	6,832	6,867	6,848	6,756	6,703
Total other private										
Pine plantations	63	145	230	293	468	724	1,304	1,616	1,740	1,814
Natural pine	6,868	6,136	5,194	4,452	3,734	3,250	2,195	1,730	1,553	1,516
Mixed pine–hardwoods	1,647	1,992	2,047	1,998	1,850	1,905	2,050	2,031	1,978	1,953
Upland hardwoods	4,391	5,003	5,818	6,399	5,915	5,681	5,645	5,773	5,795	5,746
Bottomland hardwoods	2,336	2,397	2,265	2,202	2,060	2,052	2,035	2,023	2,010	1,988
Total	**15,305**	**15,673**	**15,554**	**15,344**	**14,027**	**13,612**	**13,233**	**13,171**	**13,077**	**13,019**
Total, all ownerships										
Pine plantations	96	359	762	1,120	1,614	2,066	3,029	3,529	3,730	3,844
Natural pine	8,607	7,962	7,084	5,645	4,718	4,124	2,858	2,298	2,100	2,059
Mixed pine–hardwoods	2,027	2,405	2,468	2,433	2,264	2,295	2,412	2,398	2,355	2,334
Upland hardwoods	5,653	6,248	7,010	7,545	7,059	6,838	6,793	6,888	6,882	6,820
Bottomland hardwoods	3,199	3,015	2,806	2,693	2,703	2,674	2,577	2,515	2,471	2,432
Total	**19,582**	**19,989**	**20,130**	**19,436**	**18,358**	**17,998**	**17,673**	**17,625**	**17,539**	**17,494**

[1] Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, 1985, and the projection years are as of January 1.

[2] Includes timberland leased or under management contracts to forest industry from other owners for periods of one forest rotation or longer. Timberland under cutting contracts is not included.

[3] Data for these other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.10—Area of timberland, by ownership and forest management type in Oklahoma, selected years 1952–85, with projections to 2030[1]

Thousand acres

Ownership and forest management type	Year					Projections				
	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
National forest										
Pine plantations	2	5	10	17	30	31	32	34	35	36
Natural pine	28	40	84	83	75	73	76	77	78	78
Mixed pine–hardwoods	18	30	36	38	39	44	46	47	46	46
Upland hardwoods	151	130	83	75	65	63	59	55	53	51
Bottomland hardwoods	14	18	6	6	5	4	2	2	2	2
Total	**213**	**223**	**219**	**219**	**214**	**215**	**216**	**214**	**213**	**212**
Other public										
Pine plantations	—	—	—	—	—	6	12	16	16	17
Natural pine	56	61	37	42	48	52	57	62	66	69
Mixed pine–hardwoods	45	52	32	36	41	45	60	64	65	66
Upland hardwoods	291	203	194	185	175	155	129	120	116	114
Bottomland hardwoods	29	28	80	81	80	85	85	80	76	73
Total	**421**	**344**	**343**	**344**	**344**	**343**	**342**	**341**	**340**	**339**
Forest industry[2]										
Pine plantations	1	6	29	210	214	314	534	610	645	669
Natural pine	129	126	365	268	287	234	115	103	103	103
Mixed pine–hardwoods	109	111	256	260	295	242	160	130	122	116
Upland hardwoods	593	546	241	233	236	229	197	161	139	128
Bottomland hardwoods	57	76	42	44	23	40	58	65	64	61
Total	**889**	**865**	**933**	**1,015**	**1,055**	**1,059**	**1,064**	**1,068**	**1,073**	**1,077**
Other private:										
Farmer										
Pine plantations	([3])	([3])	([3])	6	14	42	94	105	100	93
Natural pine	([3])	([3])	([3])	94	77	72	67	69	69	65
Mixed pine–hardwoods	([3])	([3])	([3])	83	88	110	93	90	85	76
Upland hardwoods	([3])	([3])	([3])	744	915	827	722	634	560	492
Bottomland hardwoods	([3])	([3])	([3])	153	211	199	180	163	146	129
Total	([3])	([3])	([3])	1,080	1,305	1,249	1,157	1,061	960	855
Corporate										
Pine plantations	([3])	([3])	([3])	5	5	23	65	90	108	120
Natural pine	([3])	([3])	([3])	22	26	27	25	25	26	28
Mixed pine–hardwoods	([3])	([3])	([3])	30	45	47	49	52	53	54
Upland hardwoods	([3])	([3])	([3])	92	126	126	143	151	157	164
Bottomland hardwoods	([3])	([3])	([3])	10	14	16	18	20	21	22
Total	([3])	([3])	([3])	159	216	239	301	337	365	387

Table 3.10—Area of timberland, by ownership and forest management type in Oklahoma, selected years 1952–85, with projections to 2030[1]—Continued

Thousand acres

Ownership and forest management type	Year 1952	1962	1970	1977	1985	Projections 1990	2000	2010	2020	2030
Other individual										
Pine plantations	([3])	([3])	([3])	—	2	9	22	27	29	30
Natural pine	([3])	([3])	([3])	147	179	178	151	141	138	140
Mixed pine–hardwoods	([3])	([3])	([3])	229	249	250	254	255	251	249
Upland hardwoods	([3])	([3])	([3])	998	1,080	1,044	1,002	986	984	985
Bottomland hardwoods	([3])	([3])	([3])	128	104	119	129	134	136	137
Total	([3])	([3])	([3])	1,502	1,614	1,599	1,557	1,542	1,537	1,541
Total other private										
Pine plantations	3	22	11	11	21	74	181	222	237	243
Natural pine	515	505	265	263	282	277	243	235	233	233
Mixed pine–hardwoods	435	444	348	342	382	407	396	397	389	379
Upland hardwoods	2,371	2,184	2,178	1,834	2,121	1,997	1,867	1,771	1,701	1,641
Bottomland hardwoods	228	305	323	291	329	334	327	317	303	288
Total	**3,552**	**3,460**	**3,125**	**2,741**	**3,135**	**3,087**	**3,015**	**2,940**	**2,862**	**2,783**
Total, all ownerships										
Pine plantations	6	33	50	238	265	425	759	882	933	965
Natural pine	728	732	751	656	692	636	491	477	480	483
Mixed pine–hardwoods	607	637	672	676	757	738	662	638	622	607
Upland hardwoods	3,406	3,063	2,696	2,327	2,597	2,444	2,252	2,107	2,009	1,934
Bottomland hardwoods	328	427	451	422	437	463	472	464	445	424
Total	**5,075**	**4,892**	**4,620**	**4,319**	**4,748**	**4,704**	**4,637**	**4,563**	**4,488**	**4,411**

[1] Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, 1985, and the projection years are as of January 1.

[2] Includes timberland leased or under management contracts to forest industry from other owners for periods of one forest rotation or longer. Timberland under cutting contracts is not included.

[3] Data for these other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.11—Area of timberland, by ownership and forest management type in South Carolina, selected years 1952–85, with projections to 2030[1]

Thousand acres

Ownership and forest management type	Year 1952	1962	1970	1977	1985	Projections 1990	2000	2010	2020	2030
National forest										
Pine plantations	16	47	57	35	52	64	90	103	109	112
Natural pine	361	333	301	313	291	281	254	241	235	233
Mixed pine–hardwoods	59	71	76	71	84	75	74	73	72	71
Upland hardwoods	28	40	53	78	70	82	90	94	97	97
Bottomland hardwoods	99	73	64	76	80	76	71	69	70	70
Total	**563**	**564**	**551**	**573**	**577**	**578**	**579**	**581**	**583**	**584**
Other public										
Pine plantations	4	38	67	109	147	149	162	171	177	181
Natural pine	218	234	245	195	203	199	170	152	142	137
Mixed pine–hardwoods	8	39	55	59	54	58	60	59	58	56
Upland hardwoods	57	80	92	93	132	129	142	151	156	159
Bottomland hardwoods	105	79	64	55	60	62	63	63	64	65
Total	**392**	**470**	**523**	**511**	**596**	**597**	**597**	**597**	**597**	**597**
Forest industry[2]										
Pine plantations	95	280	424	603	1,048	1,196	1,530	1,693	1,748	1,766
Natural pine	771	762	621	614	474	411	240	159	144	142
Mixed pine–hardwoods	159	202	222	222	230	227	196	197	200	196
Upland hardwoods	183	258	310	355	285	274	240	229	226	221
Bottomland hardwoods	442	508	533	504	622	613	574	536	504	479
Total	**1,650**	**2,010**	**2,110**	**2,298**	**2,659**	**2,722**	**2,779**	**2,814**	**2,822**	**2,805**
Other private:										
Farmer										
Pine plantations	([3])	([3])	([3])	212	218	267	356	441	491	523
Natural pine	([3])	([3])	([3])	1,456	979	825	559	469	433	425
Mixed pine–hardwoods	([3])	([3])	([3])	697	457	381	274	252	238	231
Upland hardwoods	([3])	([3])	([3])	1,381	936	874	701	675	660	643
Bottomland hardwoods	([3])	([3])	([3])	804	716	552	401	381	374	369
Total	([3])	([3])	([3])	4,550	3,306	2,898	2,291	2,219	2,195	2,191
Corporate										
Pine plantations	([3])	([3])	([3])	98	161	211	315	370	392	399
Natural pine	([3])	([3])	([3])	359	371	379	333	314	320	338
Mixed pine–hardwoods	([3])	([3])	([3])	200	180	201	227	237	244	246
Upland hardwoods	([3])	([3])	([3])	259	262	289	347	396	424	437
Bottomland hardwoods	([3])	([3])	([3])	218	248	276	314	349	375	412
Total	([3])	([3])	([3])	1,134	1,222	1,356	1,536	1,667	1,754	1,831

Table 3.11—Area of timberland, by ownership and forest management type in South Carolina, selected years 1952–85, with projections to 2030[1]—Continued

Thousand acres

Ownership and forest management type	Year 1952	1962	1970	1977	1985	Projections 1990	2000	2010	2020	2030
Other individual										
Pine plantations	(3)	(3)	(3)	271	309	375	535	615	635	638
Natural pine	(3)	(3)	(3)	1,298	1,205	1,155	966	848	785	751
Mixed pine–hardwoods	(3)	(3)	(3)	479	562	587	641	649	641	628
Upland hardwoods	(3)	(3)	(3)	770	1,000	1,025	1,093	1,148	1,176	1,168
Bottomland hardwoods	(3)	(3)	(3)	611	794	785	842	883	912	902
Total	(3)	(3)	(3)	3,429	3,870	3,927	4,076	4,141	4,148	4,087
Total other private										
Pine plantations	118	394	529	581	688	853	1,206	1,426	1,518	1,560
Natural pine	4,538	3,452	3,263	3,113	2,555	2,359	1,858	1,631	1,538	1,514
Mixed pine–hardwoods	608	1,142	1,441	1,376	1,199	1,169	1,142	1,138	1,123	1,105
Upland hardwoods	1,501	2,078	2,421	2,410	2,198	2,188	2,141	2,219	2,260	2,248
Bottomland hardwoods	2,514	2,061	1,607	1,633	1,758	1,613	1,557	1,613	1,661	1,683
Total	**9,279**	**9,127**	**9,261**	**9,113**	**8,398**	**8,181**	**7,903**	**8,027**	**8,097**	**8,109**
Total, all ownerships										
Pine plantations	233	759	1,077	1,328	1,935	2,262	2,988	3,393	3,552	3,619
Natural pine	5,888	4,781	4,430	4,235	3,523	3,250	2,522	2,183	2,059	2,026
Mixed pine–hardwoods	834	1,454	1,794	1,728	1,567	1,529	1,472	1,467	1,453	1,428
Upland hardwoods	1,769	2,456	2,879	2,936	2,685	2,673	2,613	2,693	2,739	2,725
Bottomland hardwoods	3,160	2,721	2,265	2,268	2,520	2,364	2,265	2,281	2,299	2,297
Total	**11,884**	**12,171**	**12,445**	**12,495**	**12,230**	**12,078**	**11,858**	**12,019**	**12,099**	**12,095**

[1] Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, 1985, and the projection years are as of January 1.

[2] Includes timberland leased or under management contracts to forest industry from other owners for periods of one forest rotation or longer. Timberland under cutting contracts is not included.

[3] Data for these other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.12—Area of timberland, by ownership and forest management type in Tennessee, selected years 1952–85, with projections to 2030[1]

Thousand acres

Ownership and forest management type	Year					Projections				
	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
National forest										
Pine plantations	2	5	2	—	—	2	7	10	11	13
Natural pine	126	94	104	93	94	96	104	108	113	114
Mixed pine–hardwoods	162	108	106	109	110	112	105	108	109	109
Upland hardwoods	274	384	388	356	380	377	376	371	374	373
Bottomland hardwoods	—	—	—	—	—	—	—	—	—	—
Total	**564**	**591**	**600**	**558**	**584**	**587**	**592**	**597**	**608**	**609**
Other public										
Pine plantations	40	56	39	21	18	18	20	21	22	23
Natural pine	25	9	48	44	42	46	43	43	43	44
Mixed pine–hardwoods	166	110	121	102	93	95	120	127	128	128
Upland hardwoods	259	360	410	378	390	384	363	355	351	349
Bottomland hardwoods	60	73	69	58	60	58	52	51	50	50
Total	**550**	**608**	**687**	**603**	**603**	**601**	**599**	**597**	**595**	**594**
Forest industry[2]										
Pine plantations	9	38	55	112	141	209	387	492	562	609
Natural pine	89	73	77	63	59	56	49	62	76	84
Mixed pine–hardwoods	148	106	165	143	127	128	110	109	110	110
Upland hardwoods	432	645	787	814	859	810	699	614	555	510
Bottomland hardwoods	86	112	92	97	107	102	82	75	75	76
Total	**764**	**974**	**1,176**	**1,229**	**1,293**	**1,305**	**1,328**	**1,353**	**1,378**	**1,389**
Other private:										
Farmer										
Pine plantations	([3])	([3])	([3])	47	43	74	128	121	105	106
Natural pine	([3])	([3])	([3])	379	255	257	203	179	159	158
Mixed pine–hardwoods	([3])	([3])	([3])	473	383	363	349	315	274	264
Upland hardwoods	([3])	([3])	([3])	3,503	3,278	3,089	2,775	2,410	2,075	2,005
Bottomland hardwoods	([3])	([3])	([3])	331	298	240	142	108	92	88
Total	([3])	([3])	([3])	4,733	4,257	4,024	3,597	3,133	2,704	2,621
Corporate										
Pine plantations	([3])	([3])	([3])	26	21	27	46	62	76	85
Natural pine	([3])	([3])	([3])	44	41	55	66	76	87	94
Mixed pine–hardwoods	([3])	([3])	([3])	104	93	106	136	158	172	176
Upland hardwoods	([3])	([3])	([3])	669	828	929	1,049	1,193	1,314	1,426
Bottomland hardwoods	([3])	([3])	([3])	26	52	58	81	98	111	117
Total	([3])	([3])	([3])	869	1,035	1,175	1,379	1,587	1,760	1,898

Table 3.12—Area of timberland, by ownership and forest management type in Tennessee, selected years 1952–85, with projections to 2030[1]—Continued

Thousand acres

	Year					Projections				
Ownership and forest management type	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
Other individual										
Pine plantations	([3])	([3])	([3])	107	95	122	185	220	246	256
Natural pine	([3])	([3])	([3])	400	530	522	455	438	435	434
Mixed pine–hardwoods	([3])	([3])	([3])	523	492	502	543	559	559	550
Upland hardwoods	([3])	([3])	([3])	3,598	3,746	3,717	3,666	3,677	3,740	3,667
Bottomland hardwoods	([3])	([3])	([3])	242	302	303	370	393	405	404
Total	([3])	([3])	([3])	4,870	5,165	5,166	5,218	5,287	5,385	5,312
Total other private										
Pine plantations	55	198	221	180	159	223	359	403	427	447
Natural pine	1,453	988	790	823	826	834	724	693	681	686
Mixed pine–hardwoods	1,715	1,004	1,203	1,100	968	971	1,028	1,032	1,005	990
Upland hardwoods	6,645	8,147	7,607	7,770	7,852	7,735	7,490	7,280	7,129	7,098
Bottomland hardwoods	805	855	537	599	652	601	593	599	608	609
Total	**10,673**	**11,192**	**10,358**	**10,472**	**10,457**	**10,365**	**10,194**	**10,007**	**9,849**	**9,831**
Total, all ownerships										
Pine plantations	106	297	317	313	318	452	773	926	1,022	1,092
Natural pine	1,693	1,164	1,019	1,023	1,021	1,032	920	906	913	928
Mixed pine–hardwoods	2,191	1,328	1,595	1,454	1,298	1,306	1,363	1,376	1,352	1,337
Upland hardwoods	7,610	9,536	9,192	9,318	9,481	9,306	8,928	8,620	8,409	8,330
Bottomland hardwoods	951	1,040	698	754	819	761	727	725	733	735
Total	**12,551**	**13,365**	**12,821**	**12,862**	**12,937**	**12,858**	**12,713**	**12,554**	**12,430**	**12,423**

[1] Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, 1985, and the projection years are as of January 1.

[2] Includes timberland leased or under management contracts to forest industry from other owners for periods of one forest rotation or longer. Timberland under cutting contracts is not included.

[3] Data for these other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.13—Area of timberland, by ownership and forest management type in Texas, selected years 1952–85, with projections to 2030[1]

Thousand acres

Ownership and forest management type	Year					Projections				
	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
National forest										
Pine plantations	29	33	43	34	49	71	120	139	148	153
Natural pine	444	417	434	424	404	369	295	277	273	271
Mixed pine–hardwoods	70	67	54	75	90	105	138	137	135	134
Upland hardwoods	50	48	18	22	27	29	31	34	35	36
Bottomland hardwoods	61	58	29	21	23	22	18	17	18	18
Total	**654**	**623**	**578**	**576**	**593**	**596**	**602**	**605**	**610**	**613**
Other public										
Pine plantations	4	10	8	6	5	7	12	17	20	22
Natural pine	57	59	55	55	45	47	42	38	36	33
Mixed pine–hardwoods	34	28	22	22	31	25	21	19	18	17
Upland hardwoods	18	84	73	60	48	46	42	41	40	40
Bottomland hardwoods	19	29	43	57	30	35	41	43	45	45
Total	**132**	**210**	**201**	**200**	**159**	**159**	**158**	**158**	**158**	**157**
Forest industry[2]										
Pine plantations	16	92	174	523	869	1,216	1,990	2,290	2,416	2,484
Natural pine	1,623	1,732	1,753	1,361	816	697	390	289	255	245
Mixed pine–hardwoods	619	688	800	906	873	677	409	320	294	281
Upland hardwoods	341	379	400	523	818	720	473	384	351	336
Bottomland hardwoods	448	498	514	530	446	499	536	505	466	435
Total	**3,047**	**3,389**	**3,641**	**3,843**	**3,822**	**3,810**	**3,798**	**3,787**	**3,782**	**3,780**
Other private:										
Farmer										
Pine plantations	([3])	([3])	([3])	22	44	65	96	90	86	92
Natural pine	([3])	([3])	([3])	234	241	239	216	162	139	138
Mixed pine–hardwoods	([3])	([3])	([3])	168	262	199	116	77	62	59
Upland hardwoods	([3])	([3])	([3])	402	591	462	301	194	157	150
Bottomland hardwoods	([3])	([3])	([3])	290	232	266	255	193	163	159
Total	([3])	([3])	([3])	1,116	1,370	1,231	984	716	606	597
Corporate										
Pine plantations	([3])	([3])	([3])	5	40	90	206	285	330	361
Natural pine	([3])	([3])	([3])	160	211	207	180	167	163	165
Mixed pine–hardwoods	([3])	([3])	([3])	98	122	117	110	116	120	124
Upland hardwoods	([3])	([3])	([3])	145	187	188	218	244	262	274
Bottomland hardwoods	([3])	([3])	([3])	108	125	130	140	149	156	158
Total	([3])	([3])	([3])	516	685	733	852	961	1,031	1,082

Table 3.13—Area of timberland, by ownership and forest management type in Texas, selected years 1952–85, with projections to 2030[1]—Continued

Thousand acres

Ownership and forest management type	Year 1952	1962	1970	1977	1985	Projections 1990	2000	2010	2020	2030
Other individual										
Pine plantations	([3])	([3])	([3])	179	151	334	729	940	1,058	1,113
Natural pine	([3])	([3])	([3])	1,707	1,374	1,327	1,127	1,008	945	916
Mixed pine–hardwoods	([3])	([3])	([3])	1,255	1,097	999	911	918	904	888
Upland hardwoods	([3])	([3])	([3])	1,892	1,972	1,905	1,760	1,705	1,676	1,647
Bottomland hardwoods	([3])	([3])	([3])	1,142	964	1,000	1,049	1,042	1,020	994
Total	([3])	([3])	([3])	6,175	5,558	5,566	5,576	5,612	5,602	5,558
Total other private										
Pine plantations	55	158	232	206	235	489	1,031	1,315	1,474	1,566
Natural pine	3,519	2,957	2,341	2,101	1,826	1,773	1,523	1,337	1,247	1,219
Mixed pine–hardwoods	1,455	1,531	1,582	1,521	1,481	1,315	1,137	1,111	1,086	1,071
Upland hardwoods	2,477	2,344	2,463	2,439	2,750	2,555	2,279	2,143	2,095	2,071
Bottomland hardwoods	1,742	1,748	1,681	1,540	1,321	1,396	1,444	1,384	1,339	1,311
Total	**9,248**	**8,738**	**8,299**	**7,807**	**7,613**	**7,530**	**7,412**	**7,289**	**7,239**	**7,237**
Total, all ownerships										
Pine plantations	104	293	457	769	1,158	1,783	3,153	3,761	4,058	4,225
Natural pine	5,643	5,165	4,583	3,941	3,091	2,886	2,250	1,941	1,811	1,768
Mixed pine–hardwoods	2,178	2,314	2,458	2,524	2,475	2,122	1,705	1,587	1,533	1,503
Upland hardwoods	2,886	2,855	2,954	3,044	3,643	3,350	2,825	2,602	2,521	2,483
Bottomland hardwoods	2,270	2,333	2,267	2,148	1,820	1,952	2,039	1,949	1,868	1,809
Total	**13,081**	**12,960**	**12,719**	**12,426**	**12,187**	**12,095**	**11,970**	**11,839**	**11,789**	**11,787**

[1] Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, 1985, and the projection years are as of January 1.

[2] Includes timberland leased or under management contracts to forest industry from other owners for periods of one forest rotation or longer. Timberland under cutting contracts is not included.

[3] Data for these other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.14—Area of timberland, by ownership and forest management type in Virginia, selected years 1952–85, with projections to 2030[1]

Thousand acres

Ownership and forest management type	Year					Projections				
	1952	1962	1970	1977	1985	1990	2000	2010	2020	2030
National forest										
Pine plantations	1	1	1	1	4	14	37	62	81	94
Natural pine	108	78	78	96	110	129	178	204	220	230
Mixed pine–hardwoods	75	96	96	119	136	184	269	301	313	313
Upland hardwoods	1,014	1,028	1,028	1,208	1,236	1,192	1,061	997	960	945
Bottomland hardwoods	—	—	—	—	—	1	—	—	—	—
Total	**1,198**	**1,203**	**1,203**	**1,424**	**1,486**	**1,520**	**1,545**	**1,565**	**1,575**	**1,583**
Other public										
Pine plantations	—	—	2	4	22	35	60	75	87	94
Natural pine	149	161	140	123	123	108	73	58	53	50
Mixed pine–hardwoods	32	39	46	56	47	60	90	104	108	109
Upland hardwoods	99	123	271	297	305	282	243	223	212	204
Bottomland hardwoods	15	9	10	18	11	18	26	25	23	22
Total	**295**	**332**	**469**	**498**	**508**	**504**	**492**	**485**	**483**	**480**
Forest industry[2]										
Pine plantations	24	126	235	372	635	754	1,016	1,123	1,179	1,205
Natural pine	408	448	480	437	289	244	162	124	127	132
Mixed pine–hardwoods	119	158	201	239	235	203	151	140	143	141
Upland hardwoods	434	575	654	560	612	586	504	441	414	400
Bottomland hardwoods	110	147	78	76	82	86	76	69	67	65
Total	**1,095**	**1,454**	**1,648**	**1,684**	**1,853**	**1,872**	**1,910**	**1,898**	**1,929**	**1,943**
Other private:										
Farmer										
Pine plantations	([3])	([3])	([3])	124	201	210	260	300	318	329
Natural pine	([3])	([3])	([3])	1,168	580	500	345	288	268	268
Mixed pine–hardwoods	([3])	([3])	([3])	820	449	440	396	389	381	377
Upland hardwoods	([3])	([3])	([3])	3,750	2,705	2,371	2,039	2,020	2,021	2,009
Bottomland hardwoods	([3])	([3])	([3])	348	229	228	238	250	255	255
Total	([3])	([3])	([3])	6,210	4,164	3,748	3,278	3,247	3,244	3,238
Corporate										
Pine plantations	([3])	([3])	([3])	20	54	89	178	231	259	275
Natural pine	([3])	([3])	([3])	140	147	162	135	129	129	135
Mixed pine–hardwoods	([3])	([3])	([3])	106	101	161	247	276	289	301
Upland hardwoods	([3])	([3])	([3])	828	927	1,039	1,111	1,170	1,186	1,193
Bottomland hardwoods	([3])	([3])	([3])	61	48	79	92	97	100	[illegible]
Total	([3])	([3])	([3])	1,155	1,277	1,530	1,762	1,903	1,963	2,004

Table 3.14—Area of timberland, by ownership and forest management type in Virginia, selected years 1952–85, with projections to 2030[1]—Continued

Thousand acres

Ownership and forest management type	Year 1952	1962	1970	1977	1985	Projections 1990	2000	2010	2020	2030
Other individual										
Pine plantations	(3)	(3)	(3)	159	254	393	716	855	892	910
Natural pine	(3)	(3)	(3)	794	937	861	617	522	508	520
Mixed pine–hardwoods	(3)	(3)	(3)	592	721	850	1,047	1,057	1,038	1,026
Upland hardwoods	(3)	(3)	(3)	3,213	3,988	3,671	3,407	3,252	3,167	3,090
Bottomland hardwoods	(3)	(3)	(3)	210	248	290	269	257	251	241
Total	(3)	(3)	(3)	4,968	6,148	6,065	6,056	5,943	5,857	5,786
Total other private										
Pine plantations	21	108	194	303	509	692	1,154	1,386	1,469	1,514
Natural pine	4,267	3,161	2,584	2,102	1,664	1,523	1,097	939	905	923
Mixed pine–hardwoods	1,071	1,276	1,410	1,518	1,271	1,451	1,690	1,722	1,708	1,704
Upland hardwoods	6,731	7,815	7,944	7,791	7,620	7,081	6,557	6,442	6,374	6,292
Bottomland hardwoods	819	403	407	619	525	597	599	604	606	596
Total	**12,909**	**12,763**	**12,539**	**12,333**	**11,589**	**11,343**	**11,096**	**11,093**	**11,064**	**11,028**
Total, all ownerships										
Pine plantations	46	235	432	680	1,170	1,495	2,267	2,646	2,816	2,907
Natural pine	4,932	3,848	3,282	2,758	2,186	2,004	1,510	1,325	1,305	1,335
Mixed pine–hardwoods	1,297	1,569	1,753	1,932	1,689	1,898	2,200	2,267	2,272	2,267
Upland hardwoods	8,278	9,541	9,897	9,856	9,773	9,141	8,365	8,103	7,960	7,841
Bottomland hardwoods	944	559	495	713	618	702	701	698	696	683
Total	**15,497**	**15,752**	**15,859**	**15,939**	**15,436**	**15,239**	**15,043**	**15,041**	**15,051**	**15,034**

[1] Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, 1985, and the projection years are as of January 1.

[2] Includes timberland leased or under management contracts to forest industry from other owners for periods of one forest rotation or longer. Timberland under cutting contracts is not included.

[3] Data for these other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.15—Empirical yields of growing stock assumed for pine plantations on forest industry, other corporate, and public ownerships

Stand age	Site class High	Medium	Poor
	Cubic feet per acre		
5	0	0	0
10	500	300	140
15	1,700	1,100	600
20	2,700	1,900	1,090
25	3,500	2,500	1,425
30	4,000	3,000	1,700
35	4,300	3,300	1,900
40	4,500	3,500	2,000
45	4,650	3,625	2,050
50	4,750	3,700	2,080
55	4,800	3,750	2,090
60	4,825	3,775	2,100
65	4,850	3,800	2,110
70	4,875	3,825	2,120
75	4,900	3,850	2,130
80	4,925	3,875	2,140
85	4,950	3,900	2,150
90+	4,975	3,925	2,160

Table 3.16—Empirical yields of growing stock assumed for pine plantations on private nonindustrial ownerships

Stand age	Site class High	Medium	Poor
	Cubic feet per acre		
5	0	0	0
10	375	110	50
15	1,280	625	220
20	1,935	1,180	475
25	2,365	1,610	860
30	2,710	1,975	1,150
35	3,015	2,260	1,420
40	3,330	2,530	1,665
45	3,560	2,780	1,910
50	3,815	3,015	2,080
55	4,060	3,240	2,090
60	4,305	3,415	2,100
65	4,535	3,680	2,110
70	4,770	3,825	2,120
75	4,900	3,850	2,130
80	4,925	3,875	2,140
85	4,950	3,900	2,150
90+	4,975	3,925	2,160

Table 3.17—Empirical yields of growing stock assumed for natural pine stands on all ownerships

Stand age	Site class High	Site class Medium	Site class Poor
	Cubic feet per acre		
5	194	132	63
10	487	317	152
15	894	622	243
20	1,455	957	381
25	2,046	1,326	467
30	2,559	1,683	641
35	3,069	2,006	771
40	3,484	2,291	912
45	3,896	2,586	1,045
50	4,200	2,844	1,202
55	4,582	3,116	1,354
60	4,889	3,402	1,539
65	5,252	3,579	1,681
70	5,487	3,856	1,836
75	5,770	4,022	1,913
80	6,097	4,139	1,970
85	6,221	4,331	2,043
90+	6,554	4,562	2,135

Table 3.18—Empirical yields of growing stock assumed for mixed pine–hardwood stands on all ownerships

Stand age	Site class High	Site class Medium	Site class Poor
	Cubic feet per acre		
5	120	115	75
10	125	120	80
15	510	445	205
20	1,360	875	325
25	1,765	1,235	465
30	2,070	1,470	615
35	2,340	1,655	810
40	2,565	1,860	975
45	2,785	1,950	1,085
50	2,980	2,085	1,180
55	3,170	2,220	1,220
60	3,365	2,325	1,345
65	3,540	2,415	1,410
70	3,725	2,515	1,465
75	3,910	2,605	1,510
80	4,095	2,700	1,550
85	4,275	2,790	1,590
90+	4,450	2,875	1,630

Table 3.19—Empirical yields of growing stock assumed for upland hardwood stands on all ownerships[1]

Stand age	Site class High	Medium	Poor
	Cubic feet per acre		
5	110	90	60
10	115	95	65
15	375	305	205
20	860	575	335
25	1,505	1,085	500
30	1,975	1,410	675
35	2,270	1,660	960
40	2,525	1,855	1,165
45	2,765	2,040	1,345
50	3,000	2,200	1,520
55	3,225	2,350	1,695
60	3,450	2,500	1,870
65	3,650	2,650	1,980
70	3,850	2,800	2,090
75	3,925	2,880	2,220
80	4,000	2,960	2,350
85	4,025	3,030	2,375
90+	4,050	3,100	2,400

[1] Yields assumed in the South Central region for upland hardwood stands 25 years and older were 85 percent of the yields in this table.

Table 3.20—Empirical yields of growing stock assumed for bottomland hardwood stands on all ownerships

Stand age	Site class High	Medium	Poor
	Cubic feet per acre		
5	195	80	20
10	200	85	25
15	500	205	165
20	1,415	640	500
25	2,015	1,340	970
30	2,350	1,750	1,235
35	2,620	2,060	1,470
40	2,860	2,300	1,660
45	3,065	2,505	1,810
50	3,255	2,670	1,930
55	3,435	2,825	2,045
60	3,605	2,965	2,140
65	3,775	3,090	2,225
70	3,940	3,215	2,300
75	4,105	3,325	2,375
80	4,270	3,430	2,435
85	4,430	3,530	2,495
90+	4,590	3,625	2,555

Table 3.21—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in the Southeast region, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

	Year					Projections[3]				
Ownership and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	14	27	34	60	70	114	114	114	114	115
Timber removals[2]	15	28	36	66	79	122	121	119	118	118
Net annual growth	80	90	129	137	120	117	119	117	134	141
Inventory[4]	1,991	2,152	2,596	2,826	2,858	2,827	3,178	3,416	3,581	3,879
Other public										
Roundwood supplies[1]	51	43	69	88	90	108	112	115	119	124
Timber removals[2]	52	45	74	96	99	116	118	120	124	128
Net annual growth	70	84	126	149	167	131	119	120	124	124
Inventory[4]	1,506	1,996	2,176	2,646	3,274	3,136	3,422	3,553	3,624	3,653
Forest industry[5]										
Roundwood supplies[1]	339	290	502	634	760	862	1,079	1,245	1,392	1,407
Timber removals[2]	346	301	536	694	841	924	1,143	1,303	1,442	1,445
Net annual growth	400	472	614	755	932	1,162	1,397	1,583	1,627	1,634
Inventory[4]	6,901	8,170	9,135	9,703	11,345	10,553	12,619	15,134	17,518	19,179
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	626	646	578	451	363	351	341
Timber removals[2]	([6])	([6])	([6])	686	698	620	478	380	363	350
Net annual growth	([6])	([6])	([6])	905	575	325	324	357	384	387
Inventory[4]	([6])	([6])	([6])	15,081	11,486	10,912	7,707	6,304	6,081	6,280
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	165	192	259	316	363	390	398
Timber removals[2]	([6])	([6])	([6])	184	210	278	334	380	404	409
Net annual growth	([6])	([6])	([6])	253	270	280	368	433	453	467
Inventory[4]	([6])	([6])	([6])	4,180	4,999	5,047	5,333	5,818	6,383	6,928
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	523	710	702	732	727	723	698
Timber removals[2]	([6])	([6])	([6])	583	775	753	775	761	749	717
Net annual growth	([6])	([6])	([6])	905	878	685	739	781	773	761
Inventory[4]	([6])	([6])	([6])	14,261	16,499	14,446	13,629	13,211	13,266	13,408
Total other private										
Roundwood supplies[1]	1,393	1,152	1,107	1,314	1,548	1,540	1,499	1,453	1,463	1,437
Timber removals[2]	1,422	1,195	1,165	1,453	1,683	1,651	1,588	1,521	1,516	1,475
Net annual growth	1,324	1,506	1,826	2,063	1,723	1,290	1,432	1,572	1,611	1,615
Inventory[4]	23,427	25,973	29,815	33,522	32,984	30,405	26,670	25,334	25,731	26,616
All ownerships										
Roundwood supplies[1]	1,797	1,512	1,712	2,096	2,468	2,623	2,803	2,927	3,089	3,083
Timber removals[2]	1,835	1,569	1,811	2,309	2,702	2,813	2,970	3,064	3,201	3,166
Net annual growth	1,874	2,152	2,695	3,104	2,942	2,699	3,066	3,392	3,495	3,514
Inventory[4]	33,825	38,291	43,722	48,697	50,461	46,921	45,889	47,437	50,454	53,326

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.22—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in the South Central region, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

	Year					Projections[3]				
Ownership and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	95	102	118	112	122	182	204	223	262	287
Timber removals[2]	108	104	128	117	124	188	210	228	266	291
Net annual growth	171	234	234	214	188	190	171	179	196	209
Inventory[4]	2,984	4,714	4,740	5,517	5,507	6,015	6,394	6,254	5,893	5,283
Other public										
Roundwood supplies[1]	30	30	32	51	59	75	77	78	79	79
Timber removals[2]	33	33	33	53	62	78	79	80	80	80
Net annual growth	56	76	75	63	59	60	68	81	85	83
Inventory[4]	717	752	1,130	1,336	1,449	1,492	1,473	1,476	1,574	1,680
Forest industry[5]										
Roundwood supplies[1]	372	395	683	923	1,018	1,068	1,197	1,372	1,587	1,627
Timber removals[2]	395	402	709	941	1,047	1,105	1,232	1,403	1,614	1,650
Net annual growth	592	822	867	909	931	1,060	1,352	1,579	1,715	1,816
Inventory[4]	10,191	14,193	14,304	15,434	14,783	13,589	12,459	13,673	15,093	16,297
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	379	361	385	413	401	387	354
Timber removals[2]	([6])	([6])	([6])	378	376	408	425	410	394	359
Net annual growth	([6])	([6])	([6])	518	448	325	362	381	390	383
Inventory[4]	([6])	([6])	([6])	7,750	7,347	7,995	6,824	6,133	5,764	5,722
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	133	132	193	197	255	309	322
Timber removals[2]	([6])	([6])	([6])	132	135	200	203	261	314	327
Net annual growth	([6])	([6])	([6])	192	178	176	254	301	326	361
Inventory[4]	([6])	([6])	([6])	2,981	3,833	3,217	3,242	3,886	4,289	4,553
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	776	890	869	929	889	854	837
Timber removals[2]	([6])	([6])	([6])	787	917	899	956	910	869	849
Net annual growth	([6])	([6])	([6])	1,063	973	746	816	887	897	888
Inventory[4]	([6])	([6])	([6])	16,226	18,455	17,488	15,231	13,953	13,779	14,074
Total other private										
Roundwood supplies[1]	778	807	979	1,280	1,383	1,457	1,540	1,546	1,551	1,513
Timber removals[2]	862	822	1,005	1,297	1,428	1,507	1,584	1,581	1,577	1,535
Net annual growth	974	1,397	1,715	1,773	1,599	1,247	1,432	1,570	1,613	1,632
Inventory[4]	10,530	14,937	22,401	26,997	29,635	28,700	25,297	23,972	23,832	24,349
All ownerships										
Roundwood supplies[1]	1,275	1,334	1,812	2,366	2,581	2,782	3,018	3,219	3,478	3,506
Timber removals[2]	1,398	1,361	1,875	2,408	2,660	2,878	3,104	3,292	3,536	3,555
Net annual growth	1,793	2,529	2,891	2,959	2,778	2,558	3,024	3,409	3,609	3,740
Inventory[4]	24,422	34,616	42,575	49,284	51,375	49,796	45,623	45,375	46,393	47,609

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.23—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Alabama, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Ownership and item	Year 1952	1962	1970	1976	1984	Projections[3] 1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	9	9	10	11	16	22	21	18	18	21
Timber removals[2]	10	9	10	11	16	23	22	18	19	22
Net annual growth	20	31	24	22	16	17	15	15	17	18
Inventory[4]	278	417	516	561	461	472	445	444	465	458
Other public										
Roundwood supplies[1]	9	9	10	9	10	16	15	11	11	12
Timber removals[2]	10	9	10	9	10	17	16	11	11	12
Net annual growth	11	17	13	10	9	10	11	13	13	13
Inventory[4]	98	167	207	216	221	205	164	173	200	223
Forest industry[5]										
Roundwood supplies[1]	81	74	142	170	201	216	231	320	374	402
Timber removals[2]	85	73	141	169	205	223	237	328	380	407
Net annual growth	140	214	200	194	186	244	331	393	433	463
Inventory[4]	1,689	2,519	3,212	3,233	3,317	3,128	3,585	4,085	4,753	5,236
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	146	140	156	149	167	163	153
Timber removals[2]	([6])	([6])	([6])	146	143	161	153	171	166	155
Net annual growth	([6])	([6])	([6])	195	155	117	138	153	162	161
Inventory[4]	([6])	([6])	([6])	2,775	2,740	3,031	2,752	2,510	2,371	2,290
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	39	42	61	59	73	89	94
Timber removals[2]	([6])	([6])	([6])	38	43	63	61	75	91	95
Net annual growth	([6])	([6])	([6])	52	44	49	71	84	91	102
Inventory[4]	([6])	([6])	([6])	865	896	620	600	750	856	894
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	201	275	263	246	195	182	184
Timber removals[2]	([6])	([6])	([6])	198	280	272	253	199	185	187
Net annual growth	([6])	([6])	([6])	242	214	170	183	195	197	197
Inventory[4]	([6])	([6])	([6])	3,819	4,018	3,488	2,513	2,157	2,243	2,310
Total other private										
Roundwood supplies[1]	274	260	329	386	457	480	454	435	434	431
Timber removals[2]	285	259	330	382	466	496	467	445	442	437
Net annual growth	281	451	536	489	413	336	392	432	450	460
Inventory[4]	3,811	5,581	6,802	7,459	7,654	7,139	5,865	5,417	5,470	5,494
All ownerships										
Roundwood supplies[1]	373	352	491	576	684	733	720	783	837	867
Timber removals[2]	390	350	491	571	697	759	741	802	851	878
Net annual growth	452	713	773	715	624	608	749	853	914	953
Inventory[4]	5,876	8,684	10,737	11,469	11,653	10,943	10,060	10,120	10,888	11,411

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.24—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Arkansas, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Ownership and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	17	18	27	29	24	37	40	55	71	77
Timber removals[2]	15	18	29	31	25	39	42	56	72	79
Net annual growth	39	49	54	48	45	47	44	48	53	56
Inventory[4]	886	1,149	1,228	1,520	1,549	1,790	2,071	2,096	1,972	1,794
Other public										
Roundwood supplies[1]	8	8	5	7	5	10	11	15	17	18
Timber removals[2]	7	8	6	8	6	10	11	15	17	18
Net annual growth	5	6	5	7	7	8	12	17	19	20
Inventory[4]	41	54	91	155	158	196	291	319	357	404
Forest industry[5]										
Roundwood supplies[1]	96	98	147	204	159	193	255	198	235	242
Timber removals[2]	83	100	160	216	169	199	262	203	238	245
Net annual growth	115	143	156	168	185	203	218	249	267	283
Inventory[4]	2,384	3,278	2,692	3,124	3,184	2,875	1,881	2,071	2,396	2,705
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	32	22	26	39	17	18	17
Timber removals[2]	([6])	([6])	([6])	34	24	26	41	17	18	17
Net annual growth	([6])	([6])	([6])	46	34	23	18	18	20	21
Inventory[4]	([6])	([6])	([6])	724	605	705	380	402	426	468
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	14	12	16	17	19	19	19
Timber removals[2]	([6])	([6])	([6])	14	12	17	18	19	19	19
Net annual growth	([6])	([6])	([6])	19	17	15	18	19	18	20
Inventory[4]	([6])	([6])	([6])	292	288	234	180	155	154	151
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	96	88	86	100	112	91	91
Timber removals[2]	([6])	([6])	([6])	101	94	89	103	114	93	92
Net annual growth	([6])	([6])	([6])	136	134	100	111	114	106	99
Inventory[4]	([6])	([6])	([6])	2,158	2,343	2,426	2,358	1,887	1,818	1,844
Total other private										
Roundwood supplies[1]	83	86	98	142	122	128	156	148	128	127
Timber removals[2]	72	88	104	149	130	132	162	150	130	128
Net annual growth	130	161	188	201	185	138	147	151	144	140
Inventory[4]	1,329	1,331	2,529	3,174	3,236	3,365	2,918	2,444	2,398	2,463
All ownerships										
Roundwood supplies[1]	204	210	277	382	310	367	462	415	451	464
Timber removals[2]	177	214	299	404	330	380	475	425	458	471
Net annual growth	289	259	403	424	422	395	421	465	484	499
Inventory[4]	4,640	5,812	6,540	7,973	8,127	8,226	7,159	6,930	7,124	7,366

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.25—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Florida, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Ownership and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	5	8	8	13	20	36	51	50	50	49
Timber removals[2]	6	8	9	15	24	39	53	52	51	50
Net annual growth	22	30	45	52	56	51	52	49	53	53
Inventory[4]	521	623	797	865	942	968	1,134	1,066	1,078	1,136
Other public										
Roundwood supplies[1]	8	8	13	16	27	31	32	38	43	44
Timber removals[2]	8	8	14	19	31	33	34	39	45	45
Net annual growth	18	21	25	40	47	39	36	36	39	40
Inventory[4]	296	366	539	713	863	833	971	1,029	978	934
Forest industry[5]										
Roundwood supplies[1]	91	87	122	161	195	227	285	330	361	357
Timber removals[2]	93	91	133	190	226	243	303	346	374	367
Net annual growth	102	138	167	212	257	310	368	414	421	419
Inventory[4]	1,688	2,193	2,625	2,740	2,872	2,760	3,380	4,050	4,631	5,072
Other private:										
Farmer										
Roundwood supplies[1]	(6)	(6)	(6)	41	50	49	36	27	20	18
Timber removals[2]	(6)	(6)	(6)	48	58	52	38	28	21	18
Net annual growth	(6)	(6)	(6)	56	45	20	19	21	22	22
Inventory[4]	(6)	(6)	(6)	1,039	841	762	520	435	393	402
Corporate										
Roundwood supplies[1]	(6)	(6)	(6)	46	47	70	100	118	131	131
Timber removals[2]	(6)	(6)	(6)	55	55	76	106	123	135	135
Net annual growth	(6)	(6)	(6)	85	105	107	139	160	165	166
Inventory[4]	(6)	(6)	(6)	1,362	1,665	1,763	1,931	2,256	2,536	2,848
Other individual										
Roundwood supplies[1]	(6)	(6)	(6)	63	72	87	69	65	72	68
Timber removals[2]	(6)	(6)	(6)	74	84	94	73	67	74	69
Net annual growth	(6)	(6)	(6)	100	98	77	82	83	78	71
Inventory[4]	(6)	(6)	(6)	1,582	1,552	1,398	1,024	1,220	1,238	1,222
Total other private										
Roundwood supplies[1]	164	105	112	150	169	206	205	210	223	217
Timber removals[2]	167	109	122	177	197	222	217	218	230	222
Net annual growth	147	160	179	241	248	204	240	264	265	259
Inventory[4]	2,604	3,160	3,337	3,983	4,058	3,923	3,475	3,911	4,167	4,472
All ownerships										
Roundwood supplies[1]	268	208	255	340	411	500	572	627	677	667
Timber removals[2]	274	216	278	401	478	537	607	656	701	685
Net annual growth	289	349	416	545	608	605	697	762	777	771
Inventory[4]	5,109	6,342	7,298	8,301	8,735	8,484	8,960	10,057	10,854	11,614

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.26—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Georgia, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Ownership and item	Year 1952	1962	1970	1976	1984	Projections[3] 1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	2	4	7	9	20	26	16	17	17	17
Timber removals[2]	2	4	8	10	22	28	17	18	18	17
Net annual growth	15	19	26	24	17	18	17	16	18	20
Inventory[4]	351	381	473	449	382	313	314	325	335	367
Other public										
Roundwood supplies[1]	17	15	27	31	33	41	39	40	38	39
Timber removals[2]	18	17	29	35	37	44	42	42	40	40
Net annual growth	21	26	48	51	59	43	39	39	38	36
Inventory[4]	629	776	688	821	983	858	825	802	794	784
Forest industry[5]										
Roundwood supplies[1]	103	101	190	248	314	350	416	458	525	524
Timber removals[2]	105	105	205	272	349	375	441	479	544	538
Net annual growth	137	18	248	302	374	459	525	580	593	596
Inventory[4]	2,256	2,720	3,083	3,460	3,936	3,829	4,495	5,304	5,881	6,389
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	235	307	269	177	136	145	141
Timber removals[2]	([6])	([6])	([6])	272	339	289	188	143	150	145
Net annual growth	([6])	([6])	([6])	324	240	134	139	149	159	162
Inventory[4]	([6])	([6])	([6])	4,374	3,508	3,149	1,986	1,540	1,457	1,544
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	37	47	58	74	86	87	79
Timber removals[2]	([6])	([6])	([6])	43	52	62	78	90	90	81
Net annual growth	([6])	([6])	([6])	66	69	68	79	88	88	88
Inventory[4]	([6])	([6])	([6])	933	1,065	1,101	1,155	1,113	1,062	1,121
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	263	301	293	309	326	323	297
Timber removals[2]	([6])	([6])	([6])	304	333	315	328	341	335	304
Net annual growth	([6])	([6])	([6])	404	401	304	317	327	318	307
Inventory[4]	([6])	([6])	([6])	5,397	5,869	5,056	5,068	4,624	4,248	4,104
Total other private										
Roundwood supplies[1]	509	450	413	535	655	620	560	548	555	517
Timber removals[2]	520	466	438	619	724	666	594	574	575	530
Net annual growth	490	583	766	794	710	506	535	564	565	557
Inventory[4]	7,073	8,121	10,079	10,704	10,442	9,306	8,209	7,277	6,767	6,769
All ownerships										
Roundwood supplies[1]	631	570	637	823	1,022	1,037	1,031	1,064	1,136	1,096
Timber removals[2]	645	592	680	936	1,132	1,113	1,093	1,113	1,177	1,125
Net annual growth	663	809	1,088	1,171	1,160	1,026	1,116	1,199	1,215	1,210
Inventory[4]	10,309	11,998	14,323	15,434	15,743	14,307	13,843	13,709	13,776	14,309

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.27—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Louisiana, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

	Year					Projections[3]				
Ownership and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	10	15	19	24	23	32	27	30	36	42
Timber removals[2]	13	15	19	24	23	33	29	31	36	42
Net annual growth	22	32	29	31	26	26	23	25	28	31
Inventory[4]	268	511	620	724	679	726	786	787	771	709
Other public										
Roundwood supplies[1]	2	3	5	7	10	17	15	12	12	13
Timber removals[2]	3	4	5	7	10	17	15	13	12	13
Net annual growth	7	9	9	9	11	12	12	14	14	13
Inventory[4]	83	120	111	206	233	216	187	187	208	223
Forest industry[5]										
Roundwood supplies[1]	67	102	181	207	223	241	263	328	381	393
Timber removals[2]	84	103	184	207	224	250	270	336	388	398
Net annual growth	108	163	193	200	212	215	312	370	404	427
Inventory[4]	2,290	3,360	3,000	3,182	3,293	2,926	2,931	3,216	3,454	3,663
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	43	37	41	37	34	41	38
Timber removals[2]	([6])	([6])	([6])	43	37	42	38	35	42	38
Net annual growth	([6])	([6])	([6])	65	54	34	33	35	38	38
Inventory[4]	([6])	([6])	([6])	1,000	452	512	419	436	399	392
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	55	52	71	72	96	116	122
Timber removals[2]	([6])	([6])	([6])	55	52	74	74	98	118	123
Net annual growth	([6])	([6])	([6])	84	70	64	97	113	121	132
Inventory[4]	([6])	([6])	([6])	1,255	1,729	1,547	1,558	1,764	1,857	1,921
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	133	127	121	160	139	144	146
Timber removals[2]	([6])	([6])	([6])	133	127	125	165	142	146	148
Net annual growth	([6])	([6])	([6])	197	171	132	143	157	162	163
Inventory[4]	([6])	([6])	([6])	2,975	4,166	4,201	3,796	3,714	3,725	3,816
Total other private										
Roundwood supplies[1]	94	131	154	231	216	233	269	269	301	306
Timber removals[2]	115	131	157	231	216	241	277	275	306	309
Net annual growth	180	256	328	346	295	230	273	305	321	333
Inventory[4]	1,612	2,366	4,452	5,230	6,347	6,260	5,773	5,914	5,981	6,129
All ownerships										
Roundwood supplies[1]	173	251	359	469	472	523	575	639	730	753
Timber removals[2]	215	253	365	469	473	541	591	654	742	763
Net annual growth	317	460	559	586	544	482	620	714	767	804
Inventory[4]	4,253	6,627	8,183	9,342	10,552	10,127	9,677	10,105	10,414	10,723

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.28—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Mississippi, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

	Year					Projections[3]				
Ownership and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	31	35	39	27	32	47	54	55	66	75
Timber removals[2]	40	36	46	28	34	49	56	56	67	76
Net annual growth	36	52	63	57	50	50	43	45	49	53
Inventory[4]	579	1,089	1,074	1,253	1,262	1,291	1,355	1,337	1,272	1,123
Other public										
Roundwood supplies[1]	6	6	8	20	22	20	21	21	20	19
Timber removals[2]	7	7	8	21	23	20	22	21	20	20
Net annual growth	15	22	27	19	18	16	18	20	20	19
Inventory[4]	342	221	373	376	403	441	374	351	356	358
Forest industry[5]										
Roundwood supplies[1]	54	54	70	133	146	164	167	219	266	266
Timber removals[2]	64	56	72	134	154	169	172	224	270	270
Net annual growth	62	85	105	135	154	172	218	252	273	288
Inventory[4]	1,489	1,550	1,494	1,898	2,034	1,758	1,880	2,110	2,184	2,282
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	123	129	126	126	131	118	103
Timber removals[2]	([6])	([6])	([6])	125	136	130	130	134	120	104
Net annual growth	([6])	([6])	([6])	153	140	101	109	114	114	108
Inventory[4]	([6])	([6])	([6])	2,183	2,252	2,246	1,937	1,561	1,363	1,274
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	10	10	15	17	25	38	42
Timber removals[2]	([6])	([6])	([6])	10	11	16	17	26	39	42
Net annual growth	([6])	([6])	([6])	13	12	17	32	41	48	55
Inventory[4]	([6])	([6])	([6])	178	191	238	323	549	685	805
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	171	191	179	186	203	188	180
Timber removals[2]	([6])	([6])	([6])	174	202	185	192	208	191	183
Net annual growth	([6])	([6])	([6])	212	208	158	175	187	189	189
Inventory[4]	([6])	([6])	([6])	3,042	3,347	3,126	2,843	2,286	2,186	2,263
Total other private										
Roundwood supplies[1]	138	163	207	304	330	320	329	359	344	325
Timber removals[2]	176	169	207	309	349	331	339	368	350	329
Net annual growth	198	290	348	378	360	276	316	342	351	352
Inventory[4]	1,264	2,399	4,249	5,403	5,790	5,610	5,103	4,396	4,234	4,342
All ownerships										
Roundwood supplies[1]	229	258	324	484	530	550	572	654	695	685
Timber removals[2]	287	268	333	492	560	570	588	669	706	695
Net annual growth	311	449	543	589	582	514	594	659	693	711
Inventory[4]	3,674	5,259	7,190	8,930	9,489	9,100	8,712	8,194	8,046	8,105

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.29—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in North Carolina, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

	Year					Projections[3]				
Ownership and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	2	3	4	7	6	10	13	11	14	15
Timber removals[2]	2	3	4	8	6	10	13	11	14	15
Net annual growth	16	11	17	18	13	13	14	15	20	24
Inventory[4]	314	332	394	463	478	499	578	780	836	929
Other public										
Roundwood supplies[1]	11	8	15	16	9	12	11	11	10	12
Timber removals[2]	11	8	16	17	9	13	12	11	11	13
Net annual growth	13	17	17	18	22	18	16	16	18	18
Inventory[4]	254	323	345	375	530	549	647	704	807	871
Forest industry[5]										
Roundwood supplies[1]	67	35	76	85	67	78	128	190	225	224
Timber removals[2]	68	36	81	93	70	83	135	199	233	230
Net annual growth	74	51	58	67	120	158	210	250	261	263
Inventory[4]	1,442	1,249	1,181	1,126	1,662	1,554	2,290	2,768	3,207	3,508
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	162	152	139	112	80	75	73
Timber removals[2]	([6])	([6])	([6])	178	159	149	119	84	78	75
Net annual growth	([6])	([6])	([6])	231	135	76	72	80	85	84
Inventory[4]	([6])	([6])	([6])	4,525	3,399	3,378	2,405	1,922	1,916	1,983
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	37	50	66	65	69	79	87
Timber removals[2]	([6])	([6])	([6])	40	52	71	69	72	82	90
Net annual growth	([6])	([6])	([6])	38	42	45	69	88	96	102
Inventory[4]	([6])	([6])	([6])	780	991	892	883	986	1,201	1,327
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	70	129	127	139	122	121	126
Timber removals[2]	([6])	([6])	([6])	77	135	137	148	128	126	129
Net annual growth	([6])	([6])	([6])	173	169	131	139	149	150	153
Inventory[4]	([6])	([6])	([6])	3,473	4,180	3,684	3,491	3,397	3,675	3,882
Total other private										
Roundwood supplies[1]	310	279	258	269	331	332	316	271	275	286
Timber removals[2]	317	290	276	295	346	357	336	284	286	294
Net annual growth	334	384	416	442	346	252	280	317	331	339
Inventory[4]	6,469	7,076	7,926	8,778	8,570	7,954	6,779	6,305	6,792	7,192
All ownerships										
Roundwood supplies[1]	390	325	353	377	413	431	468	483	525	537
Timber removals[2]	398	337	377	413	431	464	496	505	544	552
Net annual growth	437	463	508	545	501	441	520	599	630	644
Inventory[4]	8,479	8,980	9,846	10,742	11,240	10,557	10,295	10,558	11,642	12,501

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.30—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Oklahoma, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Ownership and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	2	2	2	4	3	6	6	7	10	10
Timber removals[2]	2	2	2	5	3	7	6	7	10	11
Net annual growth	4	5	6	7	6	6	6	6	7	7
Inventory[4]	73	98	103	127	169	177	177	173	143	107
Other public										
Roundwood supplies[1]	—	—	—	—	1	3	3	4	5	4
Timber removals[2]	—	—	—	—	1	3	3	4	5	4
Net annual growth	2	2	2	3	2	2	3	4	4	4
Inventory[4]	2	2	26	50	57	56	66	70	63	63
Forest industry[5]										
Roundwood supplies[1]	10	11	15	32	39	31	42	38	58	55
Timber removals[2]	11	11	16	35	40	32	43	39	59	55
Net annual growth	24	25	26	28	18	34	44	52	55	57
Inventory[4]	359	456	507	520	349	332	283	408	378	359
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	2	1	2	4	2	4	4
Timber removals[2]	([6])	([6])	([6])	2	1	2	4	2	4	4
Net annual growth	([6])	([6])	([6])	6	5	5	7	8	9	8
Inventory[4]	([6])	([6])	([6])	102	125	165	190	257	295	331
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	1	1	2	2	3	5	5
Timber removals[2]	([6])	([6])	([6])	1	1	2	3	3	5	5
Net annual growth	([6])	([6])	([6])	2	2	2	3	4	5	5
Inventory[4]	([6])	([6])	([6])	28	35	26	28	47	44	46
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	4	8	11	13	10	15	12
Timber removals[2]	([6])	([6])	([6])	4	8	12	14	11	15	12
Net annual growth	([6])	([6])	([6])	11	13	10	9	11	12	11
Inventory[4]	([6])	([6])	([6])	184	262	251	218	224	183	177
Total other private										
Roundwood supplies[1]	5	5	3	7	10	15	19	15	24	21
Timber removals[2]	5	6	4	7	10	16	21	16	24	21
Net annual growth	10	10	16	19	20	17	19	23	26	24
Inventory[4]	107	136	223	314	422	442	436	528	522	554
All ownerships										
Roundwood supplies[1]	17	18	20	43	53	55	71	64	97	90
Timber removals[2]	18	19	22	47	54	57	73	66	99	91
Net annual growth	40	42	50	57	46	60	74	86	91	93
Inventory[4]	541	692	859	1,011	997	1,007	962	1,180	1,106	1,082

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.31—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in South Carolina, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Ownership and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	4	11	14	26	23	38	29	29	25	26
Timber removals[2]	4	12	14	28	26	41	30	31	26	26
Net annual growth	19	22	35	36	28	27	27	26	28	28
Inventory[4]	582	603	703	758	747	698	665	629	649	690
Other public										
Roundwood supplies[1]	6	5	6	15	14	16	18	19	19	19
Timber removals[2]	6	5	7	15	16	18	19	20	19	20
Net annual growth	11	13	26	29	29	23	19	19	20	20
Inventory[4]	112	326	371	462	571	578	603	609	613	626
Forest industry[5]										
Roundwood supplies[1]	46	41	85	94	118	139	154	174	178	188
Timber removals[2]	47	42	88	93	136	149	163	182	184	193
Net annual growth	61	76	98	122	116	150	185	214	220	221
Inventory[4]	737	1,264	1,406	1,500	1,771	1,439	1,451	1,776	2,221	2,477
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	105	75	70	67	71	66	65
Timber removals[2]	([6])	([6])	([6])	106	86	75	71	75	68	66
Net annual growth	([6])	([6])	([6])	195	101	58	57	64	70	71
Inventory[4]	([6])	([6])	([6])	2,851	2,224	2,138	1,679	1,448	1,391	1,410
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	35	32	47	52	65	65	69
Timber removals[2]	([6])	([6])	([6])	36	37	50	55	68	67	71
Net annual growth	([6])	([6])	([6])	55	43	45	60	70	74	77
Inventory[4]	([6])	([6])	([6])	853	926	925	983	1,070	1,173	1,215
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	75	133	131	121	135	125	120
Timber removals[2]	([6])	([6])	([6])	76	154	140	128	141	129	123
Net annual growth	([6])	([6])	([6])	159	127	101	115	123	124	122
Inventory[4]	([6])	([6])	([6])	2,284	2,606	2,078	1,912	1,757	1,675	1,610
Total other private										
Roundwood supplies[1]	241	180	194	215	240	248	240	271	256	254
Timber removals[2]	246	187	201	218	277	265	254	284	264	260
Net annual growth	221	248	297	409	271	204	232	257	268	270
Inventory[4]	3,370	3,873	4,691	5,988	5,756	5,141	4,574	4,275	4,239	4,235
All ownerships										
Roundwood supplies[1]	297	237	299	350	395	441	441	494	477	486
Timber removals[2]	303	246	310	354	455	473	467	517	494	499
Net annual growth	312	359	456	596	444	404	462	516	536	539
Inventory[4]	4,801	6,066	7,171	8,708	8,845	7,857	7,294	7,289	7,722	8,028

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.32—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Tennessee, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Ownership and item	Year 1952	1962	1970	1976	1984	Projections[3] 1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	3	3	3	2	4	7	11	17	18	15
Timber removals[2]	4	3	3	2	4	7	12	18	18	15
Net annual growth	11	12	14	11	11	11	11	11	12	13
Inventory[4]	220	293	261	274	328	368	365	303	246	202
Other public										
Roundwood supplies[1]	1	1	1	5	9	7	7	10	9	8
Timber removals[2]	2	1	1	5	10	7	7	10	9	8
Net annual growth	9	10	11	8	8	6	7	9	9	8
Inventory[4]	102	102	198	189	226	214	215	187	186	193
Forest industry[5]										
Roundwood supplies[1]	1	1	1	4	8	14	13	30	39	43
Timber removals[2]	1	1	1	4	9	14	13	30	40	43
Net annual growth	5	6	10	11	11	14	25	34	41	46
Inventory[4]	79	98	179	235	281	283	371	449	490	520
Other private:										
Farmer										
Roundwood supplies[1]	(6)	(6)	(6)	8	12	21	24	22	18	15
Timber removals[2]	(6)	(6)	(6)	10	14	22	24	22	18	15
Net annual growth	(6)	(6)	(6)	28	22	17	17	18	17	16
Inventory[4]	(6)	(6)	(6)	606	594	625	502	395	332	348
Corporate										
Roundwood supplies[1]	(6)	(6)	(6)	2	4	8	7	13	16	15
Timber removals[2]	(6)	(6)	(6)	2	4	8	8	14	16	15
Net annual growth	(6)	(6)	(6)	6	6	6	9	12	13	15
Inventory[4]	(6)	(6)	(6)	136	156	141	154	203	200	198
Other individual										
Roundwood supplies[1]	(6)	(6)	(6)	8	24	33	34	42	46	44
Timber removals[2]	(6)	(6)	(6)	13	26	34	35	43	47	44
Net annual growth	(6)	(6)	(6)	36	39	29	36	44	48	49
Inventory[4]	(6)	(6)	(6)	763	1,050	1,028	993	1,089	1,115	1,186
Total other private										
Roundwood supplies[1]	51	45	24	18	40	62	65	77	80	74
Timber removals[2]	67	46	28	25	44	64	67	79	81	74
Net annual growth	47	57	68	70	67	52	62	74	78	80
Inventory[4]	826	987	1,162	1,505	1,800	1,794	1,649	1,687	1,647	1,732
All ownerships										
Roundwood supplies[1]	56	50	29	29	61	89	97	133	146	139
Timber removals[2]	74	51	33	36	67	92	100	137	148	141
Net annual growth	72	85	103	100	97	83	105	126	139	147
Inventory[4]	1,227	1,780	1,800	2,203	2,635	2,660	2,599	2,627	2,571	2,647

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.33—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Texas, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Ownership and item	Year 1952	1962	1970	1976	1984	Projections[3] 1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	23	20	18	15	20	29	43	41	42	46
Timber removals[2]	24	21	19	16	19	30	44	42	43	47
Net annual growth	39	53	44	38	34	34	29	29	31	32
Inventory[4]	680	1,157	938	1,058	1,059	1,191	1,195	1,114	1,024	890
Other public										
Roundwood supplies[1]	4	3	3	3	2	4	4	5	5	5
Timber removals[2]	4	4	3	3	2	4	4	5	5	5
Net annual growth	7	10	8	7	4	5	5	5	6	6
Inventory[4]	49	86	124	144	151	164	175	188	203	217
Forest industry[5]										
Roundwood supplies[1]	63	55	127	173	242	210	228	238	235	228
Timber removals[2]	67	58	135	176	246	217	234	244	239	231
Net annual growth	138	186	177	173	165	178	204	230	242	252
Inventory[4]	1,901	2,662	3,220	3,242	2,325	2,287	1,528	1,333	1,438	1,533
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	17	20	24	34	29	26	25
Timber removals[2]	([6])	([6])	([6])	18	21	25	35	29	27	25
Net annual growth	([6])	([6])	([6])	25	38	29	39	34	30	30
Inventory[4]	([6])	([6])	([6])	360	579	711	645	571	577	620
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	12	11	19	22	26	25	26
Timber removals[2]	([6])	([6])	([6])	12	12	20	23	27	26	27
Net annual growth	([6])	([6])	([6])	16	27	23	25	28	29	32
Inventory[4]	([6])	([6])	([6])	227	538	410	399	417	492	538
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	163	177	176	190	189	190	180
Timber removals[2]	([6])	([6])	([6])	164	180	183	195	193	193	183
Net annual growth	([6])	([6])	([6])	229	194	147	159	179	184	181
Inventory[4]	([6])	([6])	([6])	3,325	3,269	2,969	2,510	2,596	2,510	2,478
Total other private										
Roundwood supplies[1]	133	117	164	192	208	219	246	244	241	231
Timber removals[2]	142	123	175	194	213	228	253	249	246	235
Net annual growth	128	172	231	270	259	199	223	241	243	243
Inventory[4]	1,581	2,157	2,984	3,912	4,386	4,090	3,554	3,584	3,579	3,636
All ownerships										
Roundwood supplies[1]	223	195	312	383	471	462	521	529	523	510
Timber removals[2]	237	206	332	389	479	478	536	541	532	517
Net annual growth	312	421	460	488	463	416	460	505	521	533
Inventory[4]	4,211	6,062	7,266	8,356	7,922	7,733	6,453	6,218	6,244	6,275

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.34—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Virginia, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Ownership and item	Year 1952	1962	1970	1976	1984	Projections[3] 1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	1	1	1	5	1	4	6	7	9	9
Timber removals[2]	1	1	1	5	1	4	7	7	9	9
Net annual growth	8	8	6	7	6	8	9	12	14	16
Inventory[4]	223	213	229	291	309	350	488	616	682	757
Other public										
Roundwood supplies[1]	9	7	8	10	7	8	10	9	9	10
Timber removals[2]	9	7	8	10	6	9	11	9	9	11
Net annual growth	7	7	10	11	10	8	8	9	10	10
Inventory[4]	215	205	233	275	327	318	375	409	433	439
Forest industry[5]										
Roundwood supplies[1]	32	26	29	46	66	69	95	92	103	115
Timber removals[2]	33	27	29	46	60	73	101	97	106	118
Net annual growth	26	26	43	52	65	85	107	125	132	136
Inventory[4]	778	744	840	877	1,104	970	1,002	1,235	1,578	1,733
Other private:										
Farmer										
Roundwood supplies[1]	(6)	(6)	(6)	83	62	50	59	47	44	44
Timber removals[2]	(6)	(6)	(6)	82	56	54	63	50	46	45
Net annual growth	(6)	(6)	(6)	99	54	37	37	43	47	47
Inventory[4]	(6)	(6)	(6)	2,292	1,514	1,485	1,116	959	924	940
Corporate										
Roundwood supplies[1]	(6)	(6)	(6)	10	16	18	25	26	29	31
Timber removals[2]	(6)	(6)	(6)	10	14	19	27	27	30	32
Net annual growth	(6)	(6)	(6)	9	11	13	21	28	31	33
Inventory[4]	(6)	(6)	(6)	252	352	367	381	393	412	417
Other individual										
Roundwood supplies[1]	(6)	(6)	(6)	52	75	63	93	81	81	88
Timber removals[2]	(6)	(6)	(6)	52	69	67	99	84	84	90
Net annual growth	(6)	(6)	(6)	69	83	72	87	99	103	107
Inventory[4]	(6)	(6)	(6)	1,525	2,292	2,229	2,134	2,212	2,431	2,589
Total other private										
Roundwood supplies[1]	169	138	130	145	153	131	177	154	154	163
Timber removals[2]	172	143	128	144	139	140	189	161	160	167
Net annual growth	132	131	168	177	148	122	145	170	181	187
Inventory[4]	3,911	3,743	3,782	4,069	4,158	4,081	3,631	3,564	3,767	3,946
All ownerships										
Roundwood supplies[1]	211	172	168	206	227	211	289	262	275	298
Timber removals[2]	215	178	166	205	206	227	307	274	285	306
Net annual growth	173	172	227	247	229	223	271	316	338	350
Inventory[4]	5,127	4,905	5,084	5,512	5,898	5,718	5,496	5,824	6,460	6,874

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.35—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in the Southeast region, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	78	329	430	819	1,362	1,809	2,036	2,069
Timber removals[2]	—	—	82	362	459	878	1,443	1,894	2,110	2,124
Net annual growth	40	207	455	690	879	1,393	1,965	2,320	2,474	2,518
Inventory[4]	301	1,636	3,431	5,029	7,945	9,744	15,466	21,029	25,254	28,981
Natural pine										
Roundwood supplies[1]	1,733	1,437	1,512	1,556	1,610	1,374	1,009	722	609	562
Timber removals[2]	1,770	1,491	1,600	1,715	1,794	1,473	1,069	756	631	577
Net annual growth	1,579	1,576	1,752	1,835	1,551	844	706	644	593	572
Inventory[4]	27,023	27,282	28,739	29,935	28,869	22,001	15,050	11,385	10,114	9,670
Mixed pine–hardwoods										
Roundwood supplies[1]	23	32	39	160	241	299	271	203	230	238
Timber removals[2]	24	33	41	176	256	320	287	213	239	244
Net annual growth	114	187	267	306	259	210	233	258	245	228
Inventory[4]	2,361	3,889	5,219	6,046	5,861	5,502	5,037	4,885	5,286	5,255
Upland hardwoods										
Roundwood supplies[1]	20	22	14	30	103	37	48	61	70	71
Timber removals[2]	20	23	15	33	105	40	50	64	72	73
Net annual growth	55	76	106	131	101	87	41	55	67	70
Inventory[4]	1,413	1,928	2,467	3,079	2,696	3,621	3,947	3,833	3,754	3,701
Bottomland hardwoods										
Roundwood supplies[1]	21	21	69	21	84	94	113	130	143	145
Timber removals[2]	21	22	73	23	88	101	120	137	149	148
Net annual growth	86	106	115	142	152	165	121	114	117	125
Inventory[4]	2,727	3,556	3,866	4,608	5,090	6,053	6,388	6,305	6,047	5,720
All management types										
Roundwood supplies[1]	1,797	1,512	1,712	2,096	2,468	2,623	2,803	2,927	3,089	3,083
Timber removals[2]	1,835	1,569	1,811	2,309	2,702	2,813	2,970	3,064	3,201	3,166
Net annual growth	1,874	2,152	2,695	3,104	2,942	2,699	3,066	3,392	3,495	3,514
Inventory[4]	33,825	38,291	43,722	48,697	50,461	46,921	45,889	47,437	50,454	53,326

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.36—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in the South Central region, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	13	37	176	254	503	1,117	1,730	2,105	2,219
Timber removals[2]	—	13	38	180	260	520	1,149	1,770	2,140	2,250
Net annual growth	36	158	213	340	429	916	1,755	2,109	2,328	2,505
Inventory[4]	357	2,100	3,596	4,793	5,622	7,505	13,225	19,280	22,338	24,639
Natural pine										
Roundwood supplies[1]	917	930	1,339	1,509	1,531	1,674	1,141	901	859	778
Timber removals[2]	988	955	1,387	1,533	1,579	1,732	1,174	922	874	789
Net annual growth	1,242	1,621	1,762	1,702	1,423	1,117	875	803	764	749
Inventory[4]	17,096	22,314	25,029	28,275	29,528	23,183	15,930	12,952	11,680	10,645
Mixed pine–hardwoods										
Roundwood supplies[1]	233	257	297	432	501	434	571	349	254	259
Timber removals[2]	269	258	306	441	519	449	587	357	258	262
Net annual growth	336	468	612	617	579	334	240	333	332	284
Inventory[4]	4,501	6,311	8,823	10,460	10,323	10,786	8,275	5,580	5,721	6,462
Upland hardwoods										
Roundwood supplies[1]	64	66	75	158	203	100	99	131	147	141
Timber removals[2]	74	67	78	162	210	104	101	134	149	143
Net annual growth	87	131	178	209	253	104	83	91	103	114
Inventory[4]	1,191	1,816	2,591	3,040	2,998	4,771	4,638	4,325	3,828	3,383
Bottomland hardwoods										
Roundwood supplies[1]	61	68	64	91	91	70	91	108	113	109
Timber removals[2]	67	68	66	92	92	72	94	110	115	111
Net annual growth	92	151	126	91	93	87	71	73	81	88
Inventory[4]	1,277	2,075	2,536	2,716	2,906	3,552	3,554	3,238	2,825	2,481
All management types										
Roundwood supplies[1]	1,275	1,334	1,812	2,366	2,581	2,782	3,018	3,219	3,478	3,506
Timber removals[2]	1,398	1,361	1,875	2,408	2,660	2,878	3,104	3,292	3,536	3,555
Net annual growth	1,793	2,529	2,891	2,959	2,778	2,558	3,024	3,409	3,609	3,740
Inventory[4]	24,422	34,616	42,575	49,284	51,375	49,796	45,623	45,375	46,393	47,609

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.37—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Alabama, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	1	7	54	80	156	253	433	530	582
Timber removals[2]	—	1	7	54	82	161	260	443	539	590
Net annual growth	8	43	46	79	90	251	463	556	620	672
Inventory[4]	99	517	1,009	1,086	1,212	1,555	3,227	5,022	6,189	6,952
Natural pine										
Roundwood supplies[1]	268	252	333	303	325	376	270	207	188	166
Timber removals[2]	281	250	333	300	331	390	278	212	191	168
Net annual growth	305	436	459	382	287	231	194	182	172	166
Inventory[4]	3,973	5,318	6,013	6,518	6,722	4,906	3,259	2,447	2,196	1,988
Mixed pine–hardwoods										
Roundwood supplies[1]	69	65	101	134	152	131	140	74	47	49
Timber removals[2]	72	65	101	133	155	135	144	76	48	49
Net annual growth	92	159	185	157	135	71	48	68	69	57
Inventory[4]	1,199	1,937	2,566	2,661	2,507	2,360	1,591	861	923	1,111
Upland hardwoods										
Roundwood supplies[1]	22	21	31	70	111	57	40	50	55	53
Timber removals[2]	23	21	31	69	113	59	42	51	55	54
Net annual growth	29	48	54	86	106	43	34	37	41	45
Inventory[4]	376	582	752	837	918	1,452	1,362	1,255	1,112	952
Bottomland hardwoods										
Roundwood supplies[1]	14	13	19	15	16	13	17	19	17	17
Timber removals[2]	14	13	19	15	16	14	18	19	17	17
Net annual growth	18	27	29	11	6	12	10	10	12	13
Inventory[4]	229	330	397	367	294	671	621	535	468	409
All management types										
Roundwood supplies[1]	373	352	491	576	684	733	720	783	837	867
Timber removals[2]	390	350	491	571	697	759	741	802	851	878
Net annual growth	452	713	773	715	624	608	749	853	914	953
Inventory[4]	5,876	8,684	10,737	11,469	11,653	10,943	10,060	10,120	10,888	11,411

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.38—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Arkansas, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	4	18	18	41	161	203	246	259
Timber removals[2]	—	—	4	19	19	42	166	207	251	263
Net annual growth	3	10	15	22	30	96	212	258	281	300
Inventory[4]	46	157	242	400	837	1,111	1,814	2,595	3,024	3,381
Natural pine										
Roundwood supplies[1]	183	188	244	223	179	230	187	130	130	130
Timber removals[2]	159	192	264	236	191	238	192	133	132	132
Net annual growth	240	271	246	273	264	209	142	127	122	122
Inventory[4]	3,861	4,393	3,995	5,006	4,949	4,209	2,701	2,290	2,146	1,980
Mixed pine–hardwoods										
Roundwood supplies[1]	8	9	12	95	74	74	89	53	45	45
Timber removals[2]	7	9	13	100	80	77	92	54	45	46
Net annual growth	24	46	94	94	93	64	47	60	57	52
Inventory[4]	385	744	1,524	1,754	1,666	1,753	1,470	960	976	1,103
Upland hardwoods										
Roundwood supplies[1]	3	3	4	40	30	15	9	11	12	11
Timber removals[2]	2	3	4	43	31	15	10	11	12	12
Net annual growth	8	16	32	24	24	10	7	7	9	10
Inventory[4]	130	256	517	502	374	501	476	448	403	374
Bottomland hardwoods										
Roundwood supplies[1]	10	10	13	6	9	8	16	19	18	18
Timber removals[2]	9	10	14	6	9	8	16	20	18	18
Net annual growth	14	16	16	11	11	17	13	13	14	15
Inventory[4]	218	262	262	311	301	653	699	637	575	528
All management types										
Roundwood supplies[1]	204	210	277	382	310	367	462	415	451	464
Timber removals[2]	177	214	299	404	330	380	475	425	458	471
Net annual growth	289	359	403	424	422	395	421	465	484	499
Inventory[4]	4,640	5,812	6,540	7,973	8,127	8,226	7,159	6,930	7,124	7,366

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.39—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Florida, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	18	103	148	251	343	456	497	484
Timber removals[2]	—	—	19	113	154	270	364	477	515	497
Net annual growth	8	60	126	195	257	375	503	576	603	603
Inventory[4]	56	440	969	1,342	1,724	2,061	3,684	5,127	6,043	7,028
Natural pine										
Roundwood supplies[1]	266	206	220	210	199	183	140	95	94	97
Timber removals[2]	272	214	241	259	257	196	148	99	97	99
Net annual growth	240	223	208	244	234	122	110	105	97	92
Inventory[4]	3,778	3,747	3,648	3,823	3,588	2,751	2,001	1,731	1,690	1,625
Mixed pine–hardwoods										
Roundwood supplies[1]	1	1	3	21	27	30	43	32	39	37
Timber removals[2]	1	1	3	23	28	32	46	33	40	38
Net annual growth	9	18	30	36	38	33	35	38	35	33
Inventory[4]	170	380	655	727	745	759	778	765	780	736
Upland hardwoods										
Roundwood supplies[1]	1	1	2	4	6	2	3	3	4	4
Timber removals[2]	1	1	2	4	6	2	3	3	4	4
Net annual growth	3	4	5	7	7	5	3	3	4	4
Inventory[4]	58	88	105	114	112	156	184	186	186	182
Bottomland hardwoods										
Roundwood supplies[1]	—	—	12	2	31	34	44	42	43	45
Timber removals[2]	—	—	13	2	33	36	46	44	44	47
Net annual growth	29	44	47	63	72	70	47	40	38	39
Inventory[4]	1,047	1,687	1,921	2,295	2,566	2,756	2,313	2,247	2,154	2,043
All management types										
Roundwood supplies[1]	268	208	255	340	411	500	572	627	677	667
Timber removals[2]	274	216	278	401	478	537	607	656	701	685
Net annual growth	289	349	416	545	608	605	697	762	777	771
Inventory[4]	5,109	6,342	7,298	8,301	8,735	8,484	8,960	10,057	10,854	11,614

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.40—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Georgia, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year 1952	1962	1970	1976	1984	Projections[3] 1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	17	128	185	338	493	633	737	737
Timber removals[2]	—	—	18	141	199	362	523	662	764	757
Net annual growth	14	74	182	251	307	522	694	800	846	860
Inventory[4]	118	623	1,404	1,983	2,539	3,097	4,854	6,462	7,396	8,359
Natural pine										
Roundwood supplies[1]	614	551	572	587	709	567	406	298	244	205
Timber removals[2]	628	573	611	676	797	608	430	312	253	211
Net annual growth	579	619	744	745	683	354	295	263	232	217
Inventory[4]	8,720	9,079	10,064	10,300	9,914	7,400	4,771	3,215	2,505	2,305
Mixed pine–hardwoods										
Roundwood supplies[1]	7	9	17	85	95	108	83	64	74	75
Timber removals[2]	7	9	18	93	102	117	88	67	77	77
Net annual growth	37	71	104	108	95	73	77	82	77	70
Inventory[4]	641	1,212	1,617	1,711	1,586	1,347	1,131	1,049	1,119	1,093
Upland hardwoods										
Roundwood supplies[1]	3	3	4	9	14	4	15	24	28	27
Timber removals[2]	3	3	5	10	14	5	16	24	28	27
Net annual growth	10	17	26	32	36	31	15	19	22	23
Inventory[4]	196	323	441	548	665	986	1,151	1,086	1,021	969
Bottomland hardwoods										
Roundwood supplies[1]	7	7	27	14	19	19	34	45	53	51
Timber removals[2]	7	7	28	16	20	21	36	47	55	52
Net annual growth	23	28	32	35	39	46	35	35	37	40
Inventory[4]	634	761	797	892	1,039	1,477	1,936	1,896	1,736	1,582
All management types										
Roundwood supplies[1]	631	570	637	823	1,022	1,037	1,031	1,064	1,136	1,096
Timber removals[2]	645	592	680	936	1,132	1,113	1,093	1,113	1,177	1,125
Net annual growth	663	809	1,088	1,171	1,160	1,026	1,116	1,199	1,215	1,210
Inventory[4]	10,309	11,998	14,323	15,434	15,743	14,307	13,843	13,709	13,776	14,309

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.41—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Louisiana, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	9	12	46	67	137	276	408	494	527
Timber removals[2]	—	9	12	46	67	142	284	417	503	534
Net annual growth	4	65	86	124	135	229	419	503	551	590
Inventory[4]	54	921	1,268	1,345	1,617	2,072	3,341	4,661	5,380	5,916
Natural pine										
Roundwood supplies[1]	96	130	262	320	305	310	185	142	141	131
Timber removals[2]	120	132	266	320	306	320	190	145	144	132
Net annual growth	184	233	325	306	264	173	135	127	124	125
Inventory[4]	2,468	3,407	4,116	4,756	5,521	4,546	3,184	2,631	2,388	2,184
Mixed pine–hardwoods										
Roundwood supplies[1]	52	75	63	59	54	45	76	50	39	42
Timber removals[2]	64	75	64	59	54	47	79	52	40	42
Net annual growth	75	74	88	92	86	47	37	54	55	47
Inventory[4]	1,008	1,047	1,244	1,482	1,450	1,671	1,387	1,118	1,131	1,274
Upland hardwoods										
Roundwood supplies[1]	8	12	11	10	11	4	13	19	23	23
Timber removals[2]	10	12	12	10	11	4	14	19	23	24
Net annual growth	13	16	21	23	21	18	15	17	21	24
Inventory[4]	179	225	303	374	382	663	718	718	689	669
Bottomland hardwoods										
Roundwood supplies[1]	17	25	11	34	35	26	25	20	33	30
Timber removals[2]	21	25	11	34	35	28	26	20	33	30
Net annual growth	41	72	39	41	38	16	14	14	15	18
Inventory[4]	544	1,027	1,252	1,385	1,582	1,175	1,047	977	826	680
All management types										
Roundwood supplies[1]	173	251	359	469	472	523	575	639	730	753
Timber removals[2]	215	253	365	469	473	541	591	654	742	763
Net annual growth	317	460	559	586	544	482	620	714	767	804
Inventory[4]	4,253	6,627	8,183	9,342	10,552	10,127	9,677	10,105	10,414	10,723

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.42—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Mississippi, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	3	10	37	27	55	201	337	417	434
Timber removals[2]	—	3	10	38	29	57	207	345	424	440
Net annual growth	6	18	38	70	85	183	332	395	437	471
Inventory[4]	76	171	499	879	813	1,472	2,620	3,723	4,079	4,371
Natural pine										
Roundwood supplies[1]	156	170	224	306	353	383	223	199	185	161
Timber removals[2]	196	180	230	309	373	396	229	204	189	164
Net annual growth	220	299	339	336	311	222	188	173	160	152
Inventory[4]	2,591	3,529	4,498	5,272	5,632	4,158	3,077	2,449	2,115	1,870
Mixed pine–hardwoods										
Roundwood supplies[1]	51	61	63	86	101	84	119	74	47	48
Timber removals[2]	64	60	65	88	107	87	122	75	48	48
Net annual growth	67	88	105	132	136	66	42	58	59	49
Inventory[4]	790	1,039	1,395	1,895	2,230	2,474	1,903	1,000	959	1,069
Upland hardwoods										
Roundwood supplies[1]	12	13	12	23	26	12	12	18	19	18
Timber removals[2]	15	14	13	24	27	12	13	18	19	18
Net annual growth	8	20	28	33	22	14	10	11	12	13
Inventory[4]	96	239	367	482	364	603	580	515	429	353
Bottomland hardwoods										
Roundwood supplies[1]	10	11	15	32	23	17	17	26	26	25
Timber removals[2]	12	11	15	33	24	17	17	27	26	25
Net annual growth	10	24	33	18	28	28	22	23	25	26
Inventory[4]	121	281	431	402	450	393	531	507	465	441
All management types										
Roundwood supplies[1]	229	258	324	484	530	550	572	654	695	685
Timber removals[2]	287	268	333	492	560	570	588	669	706	695
Net annual growth	311	449	543	589	582	514	594	659	693	711
Inventory[4]	3,674	5,259	7,190	8,930	9,489	9,100	8,712	8,194	8,046	8,105

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.43—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in North Carolina, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	21	44	26	65	188	284	341	356
Timber removals[2]	—	—	22	48	27	70	199	297	354	366
Net annual growth	5	22	52	88	113	200	322	402	438	454
Inventory[4]	19	81	201	367	1,188	1,759	3,114	4,349	5,467	6,333
Natural pine										
Roundwood supplies[1]	357	286	306	304	259	243	192	125	101	93
Timber removals[2]	364	295	327	333	270	261	203	131	105	96
Net annual growth	350	346	346	325	287	153	118	103	96	95
Inventory[4]	6,540	6,594	6,863	6,894	6,939	5,522	3,812	2,846	2,575	2,484
Mixed pine–hardwoods										
Roundwood supplies[1]	13	19	13	18	58	82	58	40	45	49
Timber removals[2]	14	20	14	20	61	88	62	42	46	50
Net annual growth	40	50	57	66	56	43	50	58	55	52
Inventory[4]	865	1,119	1,343	1,633	1,598	1,415	1,250	1,224	1,422	1,486
Upland hardwoods										
Roundwood supplies[1]	13	13	2	7	54	20	12	13	14	15
Timber removals[2]	13	14	2	8	57	22	13	13	15	15
Net annual growth	24	28	35	45	25	19	9	13	17	18
Inventory[4]	561	678	886	1,186	830	971	994	983	1,002	1,030
Bottomland hardwoods										
Roundwood supplies[1]	7	7	11	4	16	20	18	22	24	24
Timber removals[2]	7	8	12	4	16	22	19	23	25	25
Net annual growth	18	17	18	21	20	27	22	22	23	25
Inventory[4]	494	508	553	662	685	890	1,125	1,155	1,177	1,168
All management types										
Roundwood supplies[1]	390	325	353	377	413	431	468	483	525	537
Timber removals[2]	398	337	377	413	431	464	496	505	544	552
Net annual growth	437	463	508	545	501	441	520	599	630	644
Inventory[4]	8,479	8,980	9,846	10,742	11,240	10,557	10,295	10,558	11,642	12,501

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.44—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Oklahoma, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

	Year					Projections[3]				
Forest management type and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	—	1	2	3	29	36	58	55
Timber removals[2]	—	—	—	1	2	3	30	37	59	56
Net annual growth	—	1	2	2	4	21	44	54	58	61
Inventory[4]	3	20	30	35	38	104	270	487	491	511
Natural pine										
Roundwood supplies[1]	16	17	19	32	38	42	24	17	25	22
Timber removals[2]	17	18	21	35	39	43	25	18	26	23
Net annual growth	35	32	33	37	27	27	21	20	20	20
Inventory[4]	464	518	575	654	643	504	349	361	312	274
Mixed pine–hardwoods										
Roundwood supplies[1]	1	1	1	8	11	9	15	8	10	9
Timber removals[2]	1	1	1	9	11	10	16	9	10	9
Net annual growth	4	7	11	14	11	9	8	11	11	9
Inventory[4]	56	116	190	240	239	265	207	199	192	201
Upland hardwoods										
Roundwood supplies[1]	—	—	—	2	2	1	2	2	4	3
Timber removals[2]	—	—	—	2	2	1	2	2	4	3
Net annual growth	1	2	4	4	4	2	1	2	2	2
Inventory[4]	15	35	61	80	78	128	127	123	101	85
Bottomland hardwoods										
Roundwood supplies[1]	—	—	—	—	—	—	—	—	1	1
Timber removals[2]	—	—	—	—	—	—	—	—	1	1
Net annual growth	—	—	—	—	—	—	—	—	1	1
Inventory[4]	3	3	3	2	1	6	9	10	10	10
All management types										
Roundwood supplies[1]	17	18	20	43	53	55	71	64	97	90
Timber removals[2]	18	19	22	47	54	57	73	66	99	91
Net annual growth	40	42	50	57	46	60	74	86	91	93
Inventory[4]	541	692	859	1,011	997	1,007	962	1,180	1,106	1,082

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.45—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in South Carolina, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	19	44	59	134	211	292	297	308
Timber removals[2]	—	—	20	49	68	144	224	306	308	316
Net annual growth	11	44	77	123	131	199	286	341	366	371
Inventory[4]	97	429	726	1,096	1,643	1,738	2,329	2,979	3,625	4,131
Natural pine										
Roundwood supplies[1]	291	229	257	273	279	244	169	139	114	110
Timber removals[2]	297	238	266	268	321	261	179	145	118	113
Net annual growth	266	259	300	373	241	141	122	116	111	109
Inventory[4]	3,876	4,285	4,734	5,544	5,163	3,885	2,744	2,170	1,986	1,886
Mixed pine–hardwoods										
Roundwood supplies[1]	1	2	4	27	36	46	39	33	35	35
Timber removals[2]	1	2	4	30	42	49	42	35	36	36
Net annual growth	14	29	46	58	41	33	34	37	35	32
Inventory[4]	246	585	860	1,014	972	914	748	698	718	690
Upland hardwoods										
Roundwood supplies[1]	1	2	2	5	9	3	7	11	12	12
Timber removals[2]	1	2	2	6	10	4	7	11	12	12
Net annual growth	7	12	17	22	12	13	6	9	10	11
Inventory[4]	120	226	315	395	343	508	567	552	542	529
Bottomland hardwoods										
Roundwood supplies[1]	4	4	17	1	12	15	14	19	20	21
Timber removals[2]	4	4	18	1	14	16	15	20	21	21
Net annual growth	14	15	16	20	19	18	14	14	15	16
Inventory[4]	462	541	536	659	724	811	907	890	851	792
All management types										
Roundwood supplies[1]	297	237	299	350	395	441	441	494	477	486
Timber removals[2]	303	246	310	354	455	473	467	517	494	499
Net annual growth	312	359	456	596	444	404	462	516	536	539
Inventory[4]	4,801	6,066	7,171	8,708	8,845	7,857	7,294	7,289	7,722	8,028

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.46—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Tennessee, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year 1952	1962	1970	1976	1984	Projections[3] 1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	—	6	19	39	24	49	62	65
Timber removals[2]	—	—	—	8	19	40	24	50	63	66
Net annual growth	1	1	2	18	23	25	51	61	70	77
Inventory[4]	16	35	54	254	418	299	459	672	779	898
Natural pine										
Roundwood supplies[1]	17	15	6	11	19	27	33	39	42	36
Timber removals[2]	22	15	7	13	21	28	34	40	43	36
Net annual growth	24	35	50	38	34	33	30	32	33	35
Inventory[4]	412	597	826	847	931	794	695	622	541	509
Mixed pine–hardwoods										
Roundwood supplies[1]	19	17	13	9	17	18	30	27	22	21
Timber removals[2]	26	18	15	11	19	19	31	28	23	22
Net annual growth	25	28	34	27	24	16	15	24	26	22
Inventory[4]	423	482	560	648	725	736	654	608	621	676
Upland hardwoods										
Roundwood supplies[1]	18	16	9	3	5	4	9	15	18	16
Timber removals[2]	23	16	10	4	7	5	10	15	18	16
Net annual growth	20	19	16	15	14	8	7	8	9	11
Inventory[4]	340	333	329	397	466	723	704	651	565	505
Bottomland hardwoods										
Roundwood supplies[1]	2	2	1	—	1	1	2	3	2	2
Timber removals[2]	3	2	1	—	1	1	2	3	2	2
Net annual growth	2	2	1	2	2	1	1	1	1	2
Inventory[4]	36	33	31	57	95	107	88	74	64	59
All management types										
Roundwood supplies[1]	56	50	29	29	61	89	97	133	146	139
Timber removals[2]	74	51	33	36	67	92	100	137	148	141
Net annual growth	72	85	103	100	97	83	105	126	139	147
Inventory[4]	1,227	1,480	1,800	2,203	2,635	2,660	2,599	2,627	2,571	2,647

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.47—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Texas, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	4	14	41	72	172	265	296	298
Timber removals[2]	—	—	5	14	42	75	178	271	301	302
Net annual growth	14	20	24	25	62	110	234	283	311	334
Inventory[4]	63	279	494	794	687	893	1,497	2,123	2,399	2,614
Natural pine										
Roundwood supplies[1]	181	158	251	314	312	306	220	166	147	133
Timber removals[2]	193	168	266	320	318	317	226	170	149	135
Net annual growth	234	315	310	330	236	222	165	144	133	128
Inventory[4]	3,327	4,552	5,006	5,222	5,130	4,066	2,665	2,150	1,981	1,838
Mixed pine–hardwoods										
Roundwood supplies[1]	33	29	44	41	92	71	102	62	44	45
Timber removals[2]	35	30	47	41	93	73	105	63	44	46
Net annual growth	49	66	95	101	94	60	42	59	56	48
Inventory[4]	640	946	1,344	1,780	1,506	1,526	1,061	833	918	1,026
Upland hardwoods										
Roundwood supplies[1]	1	1	8	10	18	7	12	16	18	17
Timber removals[2]	1	1	8	10	19	8	12	17	18	17
Net annual growth	8	10	23	24	62	10	8	8	9	10
Inventory[4]	55	146	262	368	416	699	669	613	527	443
Bottomland hardwoods										
Roundwood supplies[1]	8	7	5	4	7	5	15	19	19	17
Timber removals[2]	8	7	6	4	7	5	15	20	19	17
Net annual growth	7	10	8	8	8	13	11	11	12	13
Inventory[4]	126	139	160	192	183	548	562	499	419	354
All management types										
Roundwood supplies[1]	223	195	312	383	471	462	521	529	523	510
Timber removals[2]	237	206	332	389	479	478	536	541	532	517
Net annual growth	312	421	460	488	463	416	460	505	521	533
Inventory[4]	4,211	6,062	7,266	8,356	7,922	7,733	6,453	6,218	6,244	6,275

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.48—Softwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of softwood growing stock in Virginia, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	3	10	12	30	125	145	164	183
Timber removals[2]	—	—	3	11	11	32	133	152	170	188
Net annual growth	2	7	18	33	71	97	161	201	221	231
Inventory[4]	11	63	131	241	851	1,088	1,486	2,114	2,726	3,131
Natural pine										
Roundwood supplies[1]	205	165	157	182	164	137	103	66	56	57
Timber removals[2]	209	171	155	179	149	147	109	69	58	58
Net annual growth	144	129	154	148	106	75	61	57	57	60
Inventory[4]	4,109	3,577	3,430	3,374	3,265	2,450	1,727	1,425	1,361	1,373
Mixed pine–hardwoods										
Roundwood supplies[1]	1	1	2	9	25	31	47	35	38	42
Timber removals[2]	1	1	2	10	23	34	50	36	40	43
Net annual growth	14	19	30	38	29	29	37	44	43	41
Inventory[4]	439	593	744	961	960	1,065	1,128	1,146	1,246	1,248
Upland hardwoods										
Roundwood supplies[1]	2	3	4	5	20	7	11	12	13	14
Timber removals[2]	2	3	4	5	18	7	12	13	14	14
Net annual growth	11	15	23	25	21	19	8	10	13	14
Inventory[4]	478	613	720	836	746	997	1,048	1,022	1,000	988
Bottomland hardwoods										
Roundwood supplies[1]	3	3	2	—	6	6	3	3	3	3
Timber removals[2]	3	3	2	—	5	7	3	3	3	4
Net annual growth	2	2	2	3	2	4	4	4	4	4
Inventory[4]	90	59	59	100	76	119	107	118	127	134
All management types										
Roundwood supplies[1]	211	172	168	206	227	211	289	262	275	298
Timber removals[2]	215	178	166	205	206	227	307	274	285	306
Net annual growth	173	172	227	247	229	223	271	316	338	350
Inventory[4]	5,127	4,905	5,084	5,512	5,898	5,718	5,496	5,824	6,460	6,874

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.49—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in the Southeast region, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

	Year					Projections[3]				
Ownership and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	9	11	18	25	20	64	71	64	70	78
Timber removals[2]	12	18	27	33	24	65	72	64	70	77
Net annual growth	73	86	122	141	144	140	122	108	100	95
Inventory[4]	2,480	2,996	3,509	4,159	5,055	4,992	5,636	6,096	6,495	6,760
Other public										
Roundwood supplies[1]	12	10	20	31	42	61	65	70	82	90
Timber removals[2]	16	16	30	42	52	62	65	70	81	89
Net annual growth	27	32	55	71	82	104	100	97	95	94
Inventory[4]	766	1,077	1,399	1,811	2,366	2,506	2,914	3,251	3,487	3,599
Forest industry[5]										
Roundwood supplies[1]	136	111	115	134	211	207	207	218	232	229
Timber removals[2]	180	183	172	185	256	211	209	218	231	227
Net annual growth	182	202	238	271	297	289	220	187	186	189
Inventory[4]	5,492	6,360	7,084	7,448	8,262	8,979	9,289	9,036	8,542	8,001
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	324	384	502	503	479	442	388
Timber removals[2]	([6])	([6])	([6])	427	448	513	509	480	441	384
Net annual growth	([6])	([6])	([6])	831	649	460	337	311	336	346
Inventory[4]	([6])	([6])	([6])	19,833	18,210	18,151	16,032	13,992	12,300	11,325
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	59	83	158	200	241	268	290
Timber removals[2]	([6])	([6])	([6])	76	95	161	202	242	267	287
Net annual growth	([6])	([6])	([6])	186	201	231	227	238	247	256
Inventory[4]	([6])	([6])	([6])	4,871	6,114	6,478	7,655	8,242	8,435	8,293
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	193	394	551	652	764	853	838
Timber removals[2]	([6])	([6])	([6])	259	447	562	660	767	850	829
Net annual growth	([6])	([6])	([6])	686	832	840	750	720	708	713
Inventory[4]	([6])	([6])	([6])	16,890	22,972	22,590	25,538	26,133	25,165	23,549
Total other private										
Roundwood supplies[1]	608	507	613	576	861	1,211	1,355	1,483	1,563	1,516
Timber removals[2]	806	835	828	762	990	1,236	1,371	1,488	1,557	1,499
Net annual growth	1,010	1,148	1,431	1,703	1,682	1,531	1,313	1,268	1,291	1,315
Inventory[4]	28,883	32,199	36,197	41,594	47,296	47,219	49,225	48,367	45,900	43,167
All ownerships										
Roundwood supplies[1]	765	639	766	766	1,134	1,542	1,697	1,834	1,947	1,913
Timber removals[2]	1,014	1,052	1,057	1,022	1,322	1,573	1,718	1,840	1,940	1,893
Net annual growth	1,292	1,468	1,846	2,186	2,205	2,064	1,755	1,660	1,672	1,693
Inventory[4]	37,621	42,632	48,189	55,012	62,979	63,697	67,065	66,749	64,424	61,528

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.50—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in the South Central region, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

	Year					Projections[3]				
Ownership and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	24	30	26	19	32	70	86	98	111	111
Timber removals[2]	33	34	39	25	38	69	85	96	109	108
Net annual growth	62	79	102	110	111	90	82	81	83	85
Inventory[4]	1,471	2,345	2,488	2,949	3,370	3,768	4,037	3,987	3,805	3,548
Other public										
Roundwood supplies[1]	33	36	36	53	60	81	96	99	100	103
Timber removals[2]	46	42	49	64	69	80	94	97	98	101
Net annual growth	55	58	85	85	90	81	73	80	89	93
Inventory[4]	1,184	1,492	1,805	2,050	2,563	2,625	2,644	2,492	2,370	2,309
Forest industry[5]										
Roundwood supplies[1]	175	199	191	243	323	364	361	369	371	359
Timber removals[2]	234	239	241	287	349	358	355	362	363	350
Net annual growth	246	266	374	421	410	446	312	260	261	282
Inventory[4]	5,762	7,949	8,294	9,956	10,252	12,240	12,045	10,968	9,642	8,541
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	268	335	387	450	453	421	352
Timber removals[2]	([6])	([6])	([6])	323	370	381	442	444	411	343
Net annual growth	([6])	([6])	([6])	580	504	425	293	261	275	284
Inventory[4]	([6])	([6])	([6])	13,003	13,310	13,893	12,836	10,596	8,418	6,964
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	70	99	215	164	222	297	305
Timber removals[2]	([6])	([6])	([6])	84	108	212	161	217	290	298
Net annual growth	([6])	([6])	([6])	156	160	169	180	190	195	216
Inventory[4]	([6])	([6])	([6])	3,583	4,670	4,612	4,795	5,296	5,158	4,454
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	387	509	687	854	913	934	943
Timber removals[2]	([6])	([6])	([6])	457	559	676	839	895	913	921
Net annual growth	([6])	([6])	([6])	853	777	827	666	670	732	757
Inventory[4]	([6])	([6])	([6])	18,880	21,873	24,584	24,930	22,687	20,417	18,499
Total other private										
Roundwood supplies[1]	754	826	737	726	943	1,289	1,467	1,588	1,652	1,599
Timber removals[2]	1,028	974	955	864	1,038	1,269	1,442	1,557	1,615	1,562
Net annual growth	1,206	1,241	1,461	1,589	1,441	1,421	1,139	1,121	1,202	1,256
Inventory[4]	32,201	31,844	33,120	35,466	39,853	43,088	42,562	38,579	33,992	29,918
All ownerships										
Roundwood supplies[1]	986	1,091	990	1,041	1,359	1,804	2,011	2,154	2,234	2,171
Timber removals[2]	1,342	1,289	1,284	1,240	1,494	1,776	1,976	2,113	2,184	2,121
Net annual growth	1,569	1,644	2,022	2,205	2,052	2,038	1,606	1,542	1,635	1,716
Inventory[4]	40,618	43,630	45,707	50,421	56,039	61,721	61,289	56,025	49,808	44,316

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.51—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Alabama, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

	Year					Projections[3]				
Ownership and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	3	4	4	5	10	17	10	9	8	7
Timber removals[2]	4	5	4	5	10	17	10	9	8	7
Net annual growth	6	7	9	10	8	7	6	6	6	6
Inventory[4]	147	218	244	259	226	193	156	128	108	91
Other public										
Roundwood supplies[1]	3	3	4	4	6	9	9	10	7	7
Timber removals[2]	4	4	4	5	6	9	9	9	7	7
Net annual growth	5	5	6	7	6	5	5	5	5	6
Inventory[4]	83	142	159	203	252	227	185	139	118	102
Forest industry[5]										
Roundwood supplies[1]	39	46	43	53	76	74	59	66	69	74
Timber removals[2]	53	59	45	58	77	72	58	65	67	72
Net annual growth	46	47	71	72	71	78	60	52	53	58
Inventory[4]	917	1,292	1,487	1,847	2,022	2,627	2,630	2,510	2,337	2,132
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	79	105	124	124	113	92	72
Timber removals[2]	([6])	([6])	([6])	86	106	123	122	111	90	71
Net annual growth	([6])	([6])	([6])	125	101	88	65	61	67	66
Inventory[4]	([6])	([6])	([6])	3,169	3,257	2,865	2,347	1,703	1,285	974
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	17	24	54	26	37	46	41
Timber removals[2]	([6])	([6])	([6])	17	24	53	26	35	45	40
Net annual growth	([6])	([6])	([6])	26	22	23	23	25	27	30
Inventory[4]	([6])	([6])	([6])	637	720	515	492	504	430	315
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	85	125	162	184	180	164	154
Timber removals[2]	([6])	([6])	([6])	91	127	159	182	177	160	151
Net annual growth	([6])	([6])	([6])	132	118	124	102	104	115	121
Inventory[4]	([6])	([6])	([6])	3,374	3,853	3,689	3,054	2,311	1,823	1,442
Total other private										
Roundwood supplies[1]	111	140	161	181	254	340	334	330	302	267
Timber removals[2]	150	179	167	194	257	335	330	323	295	262
Net annual growth	185	201	286	283	241	235	190	190	209	217
Inventory[4]	5,331	6,130	6,811	7,180	7,830	7,069	5,893	4,518	3,538	2,731
All ownerships										
Roundwood supplies[1]	156	193	212	243	346	440	413	415	385	356
Timber removals[2]	211	247	220	262	350	434	406	406	376	348
Net annual growth	242	260	372	372	326	324	261	254	272	287
Inventory[4]	6,478	7,782	8,701	9,489	10,330	10,116	8,863	7,296	6,100	5,055

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.52—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Arkansas, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Ownership and item	Year 1952	1962	1970	1976	1984	Projections[3] 1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	12	15	11	7	7	18	29	30	35	38
Timber removals[2]	13	17	21	9	9	18	28	29	35	37
Net annual growth	19	30	39	43	43	34	31	31	31	32
Inventory[4]	656	997	1,077	1,247	1,506	1,691	1,873	1,934	1,937	1,892
Other public										
Roundwood supplies[1]	6	8	5	7	7	14	21	24	28	28
Timber removals[2]	7	9	9	9	9	14	21	24	28	28
Net annual growth	7	9	18	18	18	17	16	20	23	24
Inventory[4]	360	563	444	475	537	564	643	633	579	546
Forest industry[5]										
Roundwood supplies[1]	49	61	35	46	45	71	73	65	70	69
Timber removals[2]	55	72	60	61	56	70	72	63	68	67
Net annual growth	48	64	90	84	89	95	62	49	49	52
Inventory[4]	1,366	2,200	1,915	2,026	2,272	2,569	2,577	2,401	2,117	1,869
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	28	25	39	55	40	38	35
Timber removals[2]	([6])	([6])	([6])	37	31	39	54	39	37	34
Net annual growth	([6])	([6])	([6])	63	57	44	24	21	24	27
Inventory[4]	([6])	([6])	([6])	1,501	1,426	1,594	1,366	1,161	1,022	961
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	9	11	32	28	33	46	49
Timber removals[2]	([6])	([6])	([6])	12	14	32	27	33	45	48
Net annual growth	([6])	([6])	([6])	20	26	29	35	37	36	38
Inventory[4]	([6])	([6])	([6])	477	655	634	711	841	852	769
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	63	61	95	159	151	148	142
Timber removals[2]	([6])	([6])	([6])	82	76	94	157	148	145	138
Net annual growth	([6])	([6])	([6])	141	136	144	112	108	112	112
Inventory[4]	([6])	([6])	([6])	3,322	3,468	4,706	4,777	4,200	3,638	3,284
Total other private										
Roundwood supplies[1]	123	154	133	100	97	166	242	224	232	226
Timber removals[2]	141	182	231	131	121	165	238	220	227	220
Net annual growth	279	277	229	224	219	217	171	166	172	177
Inventory[4]	7,087	5,497	5,392	5,300	5,549	6,934	6,854	6,202	5,512	5,014
All ownerships										
Roundwood supplies[1]	190	238	184	160	156	269	365	343	365	360
Timber removals[2]	216	280	321	210	195	265	358	336	356	352
Net annual growth	353	380	376	369	369	363	280	266	275	286
Inventory[4]	9,469	9,257	8,828	9,048	9,864	11,758	11,949	11,170	10,145	9,321

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.53—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Florida, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

	Year					Projections[3]				
Ownership and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	—	1	1	1	1	4	3	4	4	5
Timber removals[2]	—	1	1	1	1	4	3	4	4	5
Net annual growth	2	3	4	6	7	7	5	5	6	6
Inventory[4]	103	139	183	187	190	196	238	293	330	387
Other public										
Roundwood supplies[1]	1	1	2	6	8	16	14	13	11	10
Timber removals[2]	1	1	3	11	13	16	14	13	11	10
Net annual growth	2	2	4	7	8	9	8	8	8	9
Inventory[4]	76	108	137	238	256	342	311	255	223	211
Forest industry[5]										
Roundwood supplies[1]	20	18	13	15	21	30	24	34	39	43
Timber removals[2]	27	30	23	29	36	30	24	34	39	42
Net annual growth	32	44	37	52	59	51	38	34	34	35
Inventory[4]	1,220	1,476	1,569	1,579	1,590	1,689	1,856	1,840	1,772	1,658
Other private:										
Farmer										
Roundwood supplies[1]	(6)	(6)	(6)	8	13	28	20	21	21	16
Timber removals[2]	(6)	(6)	(6)	15	21	29	20	22	21	15
Net annual growth	(6)	(6)	(6)	31	32	20	14	14	14	14
Inventory[4]	(6)	(6)	(6)	828	863	778	675	578	456	395
Corporate										
Roundwood supplies[1]	(6)	(6)	(6)	5	5	17	22	25	30	30
Timber removals[2]	(6)	(6)	(6)	9	9	18	22	25	29	29
Net annual growth	(6)	(6)	(6)	29	33	37	30	29	29	29
Inventory[4]	(6)	(6)	(6)	941	1,111	1,110	1,147	1,129	1,102	1,121
Other individual										
Roundwood supplies[1]	(6)	(6)	(6)	9	9	23	22	23	29	31
Timber removals[2]	(6)	(6)	(6)	18	15	24	22	23	29	30
Net annual growth	(6)	(6)	(6)	34	40	40	32	29	27	26
Inventory[4]	(6)	(6)	(6)	927	1,098	1,017	969	1,063	1,064	972
Total other private										
Roundwood supplies[1]	50	29	24	22	27	68	64	69	80	77
Timber removals[2]	66	49	43	42	45	71	64	70	79	74
Net annual growth	64	62	71	94	105	97	76	72	70	69
Inventory[4]	2,118	2,278	2,369	2,696	3,072	2,905	2,791	2,770	2,622	2,488
All ownerships										
Roundwood supplies[1]	71	49	40	44	57	118	104	120	134	133
Timber removals[2]	94	81	70	83	95	120	105	120	134	131
Net annual growth	100	111	116	159	179	164	127	119	119	119
Inventory[4]	3,517	4,001	4,258	4,700	5,108	5,130	5,196	5,159	4,947	4,744

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.54—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Georgia, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

	Year					Projections[3]				
Ownership and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	2	2	4	4	5	22	27	22	24	26
Timber removals[2]	2	3	6	7	8	22	27	22	24	25
Net annual growth	13	14	23	24	26	25	21	18	17	15
Inventory[4]	582	689	738	801	855	837	795	773	720	608
Other public										
Roundwood supplies[1]	5	4	6	5	7	14	17	18	24	26
Timber removals[2]	7	7	9	9	11	14	17	18	24	26
Net annual growth	9	9	10	16	24	31	28	28	28	28
Inventory[4]	237	281	315	422	574	611	750	862	925	951
Forest industry[5]										
Roundwood supplies[1]	38	38	25	31	52	69	75	71	85	86
Timber removals[2]	49	63	37	51	77	70	76	72	85	85
Net annual growth	49	61	65	82	102	102	79	67	67	70
Inventory[4]	1,299	1,622	1,958	2,263	2,626	2,911	3,041	3,030	2,866	2,687
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	59	76	144	143	110	90	72
Timber removals[2]	([6])	([6])	([6])	97	114	147	144	111	90	71
Net annual growth	([6])	([6])	([6])	162	162	114	80	67	70	70
Inventory[4]	([6])	([6])	([6])	3,800	3,864	3,679	2,871	2,270	1,860	1,678
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	8	10	26	38	46	55	59
Timber removals[2]	([6])	([6])	([6])	13	15	27	39	46	55	59
Net annual growth	([6])	([6])	([6])	31	38	44	44	47	49	50
Inventory[4]	([6])	([6])	([6])	813	959	1,046	1,355	1,539	1,580	1,526
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	49	61	124	161	184	228	227
Timber removals[2]	([6])	([6])	([6])	81	90	126	162	185	227	224
Net annual growth	([6])	([6])	([6])	178	225	227	210	209	209	210
Inventory[4]	([6])	([6])	([6])	4,591	5,410	5,427	6,688	7,151	7,074	6,795
Total other private										
Roundwood supplies[1]	158	135	131	116	147	294	342	340	373	358
Timber removals[2]	212	221	196	191	219	300	345	342	372	354
Net annual growth	258	268	310	371	425	385	334	323	328	330
Inventory[4]	6,073	7,113	8,237	9,204	10,233	10,152	10,914	10,960	10,514	9,999
All ownerships										
Roundwood supplies[1]	203	179	166	156	211	399	462	452	506	496
Timber removals[2]	270	294	248	258	315	407	465	453	505	491
Net annual growth	329	352	408	493	577	541	462	436	438	443
Inventory[4]	8,181	9,705	11,248	12,690	14,288	14,511	15,500	15,627	15,025	14,245

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.55—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Louisiana, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

	Year					Projections[3]				
Ownership and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	—	—	1	1	3	6	13	13	15	14
Timber removals[2]	1	—	1	1	4	6	12	13	14	14
Net annual growth	3	3	6	7	11	9	9	9	10	10
Inventory[4]	89	147	139	214	256	290	315	287	247	200
Other public										
Roundwood supplies[1]	3	3	6	6	4	6	11	13	17	18
Timber removals[2]	5	4	7	6	5	6	11	13	16	18
Net annual growth	5	4	9	11	20	18	16	18	21	22
Inventory[4]	114	142	180	306	521	568	655	716	756	807
Forest industry[5]										
Roundwood supplies[1]	16	17	48	52	53	44	59	56	63	69
Timber removals[2]	23	19	57	62	55	43	58	55	62	67
Net annual growth	41	33	64	82	72	78	59	53	56	63
Inventory[4]	1,263	1,721	1,791	2,162	1,932	2,544	2,628	2,573	2,484	2,382
Other private:										
Farmer										
Roundwood supplies[1]	(6)	(6)	(6)	19	23	21	34	28	28	28
Timber removals[2]	(6)	(6)	(6)	22	24	20	33	28	28	27
Net annual growth	(6)	(6)	(6)	46	38	27	18	19	23	24
Inventory[4]	(6)	(6)	(6)	1,077	611	704	646	543	471	432
Corporate										
Roundwood supplies[1]	(6)	(6)	(6)	26	35	59	59	68	86	86
Timber removals[2]	(6)	(6)	(6)	32	37	58	58	67	83	84
Net annual growth	(6)	(6)	(6)	64	57	58	57	56	55	60
Inventory[4]	(6)	(6)	(6)	1,472	1,740	1,664	1,573	1,511	1,385	1,118
Other individual										
Roundwood supplies[1]	(6)	(6)	(6)	45	61	135	96	91	99	106
Timber removals[2]	(6)	(6)	(6)	53	64	133	95	89	97	104
Net annual growth	(6)	(6)	(6)	109	98	111	89	92	103	107
Inventory[4]	(6)	(6)	(6)	2,582	3,380	2,975	3,311	3,325	3,243	3,221
Total other private										
Roundwood supplies[1]	121	116	84	90	119	215	189	187	213	220
Timber removals[2]	164	128	99	107	125	211	186	184	208	215
Net annual growth	145	108	174	219	193	196	164	167	181	191
Inventory[4]	5,290	6,301	5,697	5,131	5,731	5,343	5,530	5,379	5,099	4,771
All ownerships										
Roundwood supplies[1]	140	136	139	149	179	272	271	270	307	322
Timber removals[2]	193	151	164	176	189	267	267	265	300	315
Net annual growth	194	148	253	319	296	302	248	247	267	286
Inventory[4]	6,756	8,311	7,807	7,813	8,440	8,744	9,128	8,956	8,586	8,161

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.56—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Mississippi, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Ownership and item	Year 1952	1962	1970	1976	1984	Projections[3] 1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	4	5	4	3	5	11	15	19	23	25
Timber removals[2]	6	5	5	3	6	11	15	19	23	24
Net annual growth	16	18	18	22	21	18	16	15	16	16
Inventory[4]	144	395	342	502	538	689	751	734	682	600
Other public										
Roundwood supplies[1]	10	11	9	17	23	16	22	22	16	16
Timber removals[2]	14	12	12	18	25	16	21	22	16	16
Net annual growth	16	17	17	15	15	13	11	12	13	13
Inventory[4]	199	188	336	366	417	486	410	304	262	240
Forest industry[5]										
Roundwood supplies[1]	27	30	26	41	55	73	70	79	82	68
Timber removals[2]	37	33	33	45	61	71	69	77	80	66
Net annual growth	46	50	51	70	85	92	62	50	50	52
Inventory[4]	680	1,037	1,027	1,407	1,603	1,737	1,723	1,472	1,108	869
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	68	87	75	91	104	96	79
Timber removals[2]	([6])	([6])	([6])	74	96	74	89	102	94	77
Net annual growth	([6])	([6])	([6])	135	120	98	69	64	68	66
Inventory[4]	([6])	([6])	([6])	2,563	2,742	2,845	2,822	2,290	1,793	1,341
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	5	6	15	11	16	23	26
Timber removals[2]	([6])	([6])	([6])	6	7	15	10	16	22	25
Net annual growth	([6])	([6])	([6])	11	11	13	15	17	18	20
Inventory[4]	([6])	([6])	([6])	205	241	396	415	519	541	502
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	86	122	113	165	202	195	205
Timber removals[2]	([6])	([6])	([6])	95	135	111	162	198	191	200
Net annual growth	([6])	([6])	([6])	171	171	183	144	147	163	168
Inventory[4]	([6])	([6])	([6])	3,262	3,889	4,715	5,029	4,362	3,952	3,654
Total other private										
Roundwood supplies[1]	190	211	178	159	215	203	267	322	314	310
Timber removals[2]	257	234	223	175	238	200	261	316	307	302
Net annual growth	264	282	286	317	302	294	228	228	249	254
Inventory[4]	5,347	4,662	4,984	6,030	6,872	7,956	8,266	7,171	6,286	5,497
All ownerships										
Roundwood supplies[1]	231	257	217	220	298	303	373	442	436	418
Timber removals[2]	314	284	273	241	330	298	367	433	426	408
Net annual growth	342	367	372	424	423	416	317	305	328	336
Inventory[4]	6,370	6,282	6,689	8,305	9,430	10,867	11,150	9,681	8,337	7,206

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.57—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in North Carolina, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

	Year					Projections[3]				
Ownership and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	4	3	5	3	4	12	15	12	15	17
Timber removals[2]	6	7	10	6	5	12	15	12	15	17
Net annual growth	27	33	38	47	48	45	41	36	34	32
Inventory[4]	813	1,027	1,124	1,274	1,727	1,714	1,982	2,211	2,422	2,598
Other public										
Roundwood supplies[1]	3	2	5	6	12	14	16	16	22	25
Timber removals[2]	4	3	10	6	12	15	16	16	22	25
Net annual growth	6	10	14	15	17	22	22	22	21	21
Inventory[4]	171	291	296	327	514	514	587	654	682	661
Forest industry[5]										
Roundwood supplies[1]	29	18	19	26	31	27	29	27	32	35
Timber removals[2]	38	29	42	36	32	27	29	27	32	35
Net annual growth	51	40	48	42	51	51	39	33	33	34
Inventory[4]	1,532	1,211	1,240	1,235	1,405	1,611	1,754	1,802	1,803	1,761
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	111	132	164	169	153	158	141
Timber removals[2]	([6])	([6])	([6])	152	141	167	171	154	158	140
Net annual growth	([6])	([6])	([6])	276	216	154	117	111	121	124
Inventory[4]	([6])	([6])	([6])	6,622	5,924	5,940	5,335	4,732	4,147	3,720
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	10	20	35	48	55	66	75
Timber removals[2]	([6])	([6])	([6])	13	21	36	49	55	66	74
Net annual growth	([6])	([6])	([6])	43	51	59	60	64	68	70
Inventory[4]	([6])	([6])	([6])	1,160	1,425	1,573	1,975	2,264	2,448	2,460
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	29	131	178	212	225	266	256
Timber removals[2]	([6])	([6])	([6])	40	139	181	214	225	265	253
Net annual growth	([6])	([6])	([6])	201	244	243	220	213	210	213
Inventory[4]	([6])	([6])	([6])	4,771	6,716	6,566	7,255	7,373	6,962	6,479
Total other private										
Roundwood supplies[1]	162	143	182	150	283	377	429	433	490	472
Timber removals[2]	214	235	252	205	301	384	434	434	489	467
Net annual growth	273	342	423	520	511	456	397	388	399	407
Inventory[4]	8,196	9,229	10,734	12,553	14,065	14,079	14,565	14,369	13,557	12,659
All ownerships										
Roundwood supplies[1]	198	166	211	185	330	430	490	487	559	549
Timber removals[2]	262	274	314	253	350	439	494	489	557	543
Net annual growth	357	425	523	624	627	573	499	480	487	494
Inventory[4]	10,712	11,758	13,394	15,389	17,711	17,919	18,888	19,035	18,463	17,679

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.58—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Oklahoma, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

	Year					Projections[3]				
Ownership and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	—	—	—	—	2	4	3	3	3	2
Timber removals[2]	1	—	—	1	2	4	3	3	3	2
Net annual growth	1	2	2	3	2	2	2	2	2	2
Inventory[4]	43	55	66	75	81	73	52	43	36	30
Other public										
Roundwood supplies[1]	1	1	1	2	1	2	3	5	6	7
Timber removals[2]	1	1	2	2	1	2	3	5	6	7
Net annual growth	3	3	5	6	6	6	5	5	5	5
Inventory[4]	31	31	88	97	119	144	169	175	163	143
Forest industry[5]										
Roundwood supplies[1]	3	2	3	3	10	13	13	8	6	6
Timber removals[2]	4	2	3	3	11	13	12	8	6	6
Net annual growth	6	7	10	13	5	6	5	4	4	5
Inventory[4]	129	130	169	212	157	240	156	97	79	58
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	5	9	13	16	18	14	8
Timber removals[2]	([6])	([6])	([6])	5	10	13	15	17	14	8
Net annual growth	([6])	([6])	([6])	18	14	12	9	8	8	8
Inventory[4]	([6])	([6])	([6])	301	424	409	347	256	164	118
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	—	1	1	1	2	2	3
Timber removals[2]	([6])	([6])	([6])	1	1	1	1	2	2	3
Net annual growth	([6])	([6])	([6])	1	1	1	1	2	2	2
Inventory[4]	([6])	([6])	([6])	23	34	32	39	45	42	34
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	5	4	6	9	12	16	18
Timber removals[2]	([6])	([6])	([6])	6	4	6	9	12	16	18
Net annual growth	([6])	([6])	([6])	20	11	12	10	10	11	12
Inventory[4]	([6])	([6])	([6])	344	407	428	455	454	415	353
Total other private										
Roundwood supplies[1]	17	14	14	10	14	20	26	32	32	29
Timber removals[2]	21	15	17	12	16	20	25	31	32	29
Net annual growth	26	32	35	39	26	25	20	20	21	22
Inventory[4]	637	611	669	668	865	869	841	755	621	505
All ownerships										
Roundwood supplies[1]	21	17	18	15	27	40	44	47	48	44
Timber removals[2]	27	18	22	18	30	39	43	46	47	43
Net annual growth	36	44	52	61	39	38	31	30	31	33
Inventory[4]	840	827	992	1,052	1,222	1,327	1,218	1,070	898	736

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.59—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in South Carolina, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

	Year					Projections[3]				
Ownership and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	—	1	1	2	3	11	8	8	9	9
Timber removals[2]	—	1	1	2	3	11	8	8	9	9
Net annual growth	6	7	12	15	10	11	9	9	9	9
Inventory[4]	195	259	310	385	406	360	374	372	381	333
Other public										
Roundwood supplies[1]	—	—	3	3	3	4	4	4	6	6
Timber removals[2]	—	—	3	4	3	4	4	4	6	6
Net annual growth	4	4	9	12	10	13	12	12	12	13
Inventory[4]	76	167	219	278	330	351	440	525	600	671
Forest industry[5]										
Roundwood supplies[1]	38	25	27	30	42	39	32	34	37	37
Timber removals[2]	51	42	32	33	43	40	32	34	37	36
Net annual growth	25	28	46	51	41	40	30	26	26	27
Inventory[4]	650	1,165	1,386	1,430	1,544	1,632	1,625	1,534	1,420	1,293
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	42	47	61	50	50	51	45
Timber removals[2]	([6])	([6])	([6])	46	48	63	50	50	51	45
Net annual growth	([6])	([6])	([6])	132	78	55	38	34	38	40
Inventory[4]	([6])	([6])	([6])	3,004	2,759	2,720	2,441	2,190	2,001	1,883
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	14	21	42	39	46	50	50
Timber removals[2]	([6])	([6])	([6])	16	22	43	40	46	50	50
Net annual growth	([6])	([6])	([6])	33	26	30	30	32	34	37
Inventory[4]	([6])	([6])	([6])	766	955	867	905	865	785	664
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	32	52	78	71	87	100	94
Timber removals[2]	([6])	([6])	([6])	36	53	80	72	87	99	93
Net annual growth	([6])	([6])	([6])	91	84	87	80	81	83	85
Inventory[4]	([6])	([6])	([6])	2,226	2,823	2,654	2,967	2,954	2,816	2,711
Total other private										
Roundwood supplies[2]	112	74	95	88	120	181	160	183	201	189
Timber removals[2]	148	121	112	98	123	186	162	183	200	188
Net annual growth	164	184	198	256	188	172	148	147	155	162
Inventory[4]	4,490	4,611	5,028	5,996	6,537	6,241	6,313	6,009	5,602	5,258
All ownerships										
Roundwood supplies[1]	150	100	126	123	168	235	204	229	251	241
Timber removals[2]	199	164	148	137	172	240	206	230	251	239
Net annual growth	199	223	265	334	249	235	199	195	203	210
Inventory[4]	5,411	6,202	6,943	8,089	8,817	8,584	8,753	8,439	8,003	7,604

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.60—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Tennessee, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

	Year					Projections[3]				
Ownership and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	4	4	4	2	3	7	10	14	17	17
Timber removals[2]	6	5	6	4	4	7	10	14	16	17
Net annual growth	13	15	23	19	20	15	13	13	13	13
Inventory[4]	276	388	476	503	595	651	694	704	680	635
Other public										
Roundwood supplies[1]	7	7	8	13	18	32	27	22	21	20
Timber removals[2]	11	8	11	20	22	32	27	21	21	20
Net annual growth	15	16	25	21	21	18	17	17	18	18
Inventory[4]	378	403	527	510	603	494	405	339	308	288
Forest industry[5]										
Roundwood supplies[1]	25	24	10	15	23	26	23	32	37	35
Timber removals[2]	39	29	14	23	27	26	23	32	36	34
Net annual growth	20	23	36	35	35	38	27	19	18	20
Inventory[4]	437	567	754	893	893	1,085	1,167	1,102	901	699
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	58	78	102	115	133	137	114
Timber removals[2]	([6])	([6])	([6])	87	93	100	113	131	133	111
Net annual growth	([6])	([6])	([6])	164	150	136	95	78	74	80
Inventory[4]	([6])	([6])	([6])	3,844	4,128	4,640	4,470	3,938	3,102	2,614
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	9	16	39	30	51	73	77
Timber removals[2]	([6])	([6])	([6])	12	19	39	29	50	71	75
Net annual growth	([6])	([6])	([6])	24	32	34	37	40	44	50
Inventory[4]	([6])	([6])	([6])	576	896	936	1,097	1,343	1,382	1,251
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	51	82	111	144	172	190	196
Timber removals[2]	([6])	([6])	([6])	78	97	109	142	169	186	192
Net annual growth	([6])	([6])	([6])	149	157	164	137	134	144	152
Inventory[4]	([6])	([6])	([6])	3,472	4,314	4,816	5,019	4,985	4,682	4,237
Total other private										
Roundwood supplies[1]	150	138	110	118	176	252	289	356	400	387
Timber removals[2]	231	169	152	177	209	248	284	350	390	378
Net annual growth	228	256	322	337	339	334	269	252	262	282
Inventory[4]	5,932	6,460	6,840	7,892	9,338	10,392	10,586	10,266	9,166	8,102
All ownerships										
Roundwood supplies[1]	186	173	132	148	220	317	348	425	475	460
Timber removals[2]	287	211	183	224	262	312	343	416	463	450
Net annual growth	276	310	406	412	415	406	326	300	311	339
Inventory[4]	7,023	7,818	8,597	9,798	11,429	12,623	12,852	12,412	11,055	9,723

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.61—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Texas, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

	Year					Projections[3]				
Ownership and item	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	1	2	2	1	2	6	8	10	10	8
Timber removals[2]	3	2	2	2	3	6	8	10	10	7
Net annual growth	4	4	5	6	6	5	5	6	6	6
Inventory[4]	116	145	144	149	168	182	196	157	115	100
Other public										
Roundwood supplies[1]	3	3	3	4	1	1	2	3	4	4
Timber removals[2]	4	4	4	4	1	1	2	3	4	4
Net annual growth	4	4	5	7	4	4	3	3	4	4
Inventory[4]	19	23	71	93	114	142	177	184	184	184
Forest industry[5]										
Roundwood supplies[1]	16	19	26	33	61	64	64	64	45	38
Timber removals[2]	23	25	29	35	62	63	63	63	44	37
Net annual growth	39	42	52	65	53	58	38	32	31	32
Inventory[4]	970	1,002	1,151	1,409	1,373	1,438	1,165	813	616	532
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	11	8	12	16	16	17	15
Timber removals[2]	([6])	([6])	([6])	12	10	12	15	16	17	15
Net annual growth	([6])	([6])	([6])	29	24	20	14	11	11	11
Inventory[4]	([6])	([6])	[6])	548	722	835	837	705	581	525
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	4	6	14	10	16	22	23
Timber removals[2]	([6])	([6])	([6])	4	6	14	10	15	21	23
Net annual growth	([6])	([6])	([6])	10	11	12	12	14	14	16
Inventory[4]	([6])	([6])	([6])	193	384	435	468	533	527	466
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	52	54	66	94	104	122	121
Timber removals[2]	([6])	([6])	([6])	52	56	65	93	102	119	119
Net annual growth	([6])	([6])	([6])	131	86	90	71	74	84	85
Inventory[4]	([6])	([6])	([6])	2,524	2,562	3,254	3,285	3,049	2,664	2,307
Total other private										
Roundwood supplies[1]	42	53	57	68	68	92	120	136	161	159
Timber removals[2]	64	67	66	68	72	91	118	133	157	157
Net annual growth	79	85	129	170	121	122	97	99	109	112
Inventory[4]	2,577	2,183	2,727	3,265	3,668	4,524	4,590	4,287	3,772	3,298
All ownerships										
Roundwood supplies[1]	62	77	88	106	133	164	194	214	220	209
Timber removals[2]	94	98	101	109	138	161	191	210	215	204
Net annual growth	126	135	191	248	184	188	143	140	151	155
Inventory[4]	3,682	3,353	4,093	4,916	5,324	6,286	6,129	5,441	4,687	4,114

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.62—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Virginia, by ownership, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Ownership and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
National forest										
Roundwood supplies[1]	3	4	7	15	7	15	18	19	19	22
Timber removals[2]	4	6	9	17	7	15	18	19	19	21
Net annual growth	25	29	45	49	53	53	46	39	35	33
Inventory[4]	787	882	1,154	1,512	1,877	1,886	2,247	2,447	2,641	2,785
Other public										
Roundwood supplies[1]	3	3	4	11	12	11	14	19	19	22
Timber removals[2]	4	5	5	12	13	12	14	19	19	22
Net annual growth	6	7	18	21	23	29	29	27	25	24
Inventory[4]	206	230	432	546	692	688	825	954	1,058	1,106
Forest industry[5]										
Roundwood supplies[1]	11	12	31	32	65	43	48	52	38	29
Timber removals[2]	15	19	38	36	68	44	48	52	38	28
Net annual growth	25	29	42	44	44	45	34	26	24	24
Inventory[4]	791	886	931	941	1,097	1,137	1,013	830	682	602
Other private:										
Farmer										
Roundwood supplies[1]	([6])	([6])	([6])	104	116	105	123	142	122	114
Timber removals[2]	([6])	([6])	([6])	117	124	107	124	143	121	113
Net annual growth	([6])	([6])	([6])	230	161	118	88	84	93	98
Inventory[4]	([6])	([6])	([6])	5,579	4,800	5,035	4,708	4,222	3,836	3,648
Corporate										
Roundwood supplies[1]	([6])	([6])	([6])	22	27	37	51	70	67	76
Timber removals[2]	([6])	([6])	([6])	25	28	38	52	70	67	75
Net annual growth	([6])	([6])	([6])	50	53	62	64	66	67	69
Inventory[4]	([6])	([6])	([6])	1,191	1,664	1,881	2,274	2,445	2,521	2,523
Other individual										
Roundwood supplies[1]	([6])	([6])	([6])	74	141	149	188	246	231	230
Timber removals[2]	([6])	([6])	([6])	84	150	152	190	246	230	228
Net annual growth	([6])	([6])	([6])	182	239	244	208	188	179	179
Inventory[4]	([6])	([6])	([6])	4,375	6,925	6,927	7,660	7,592	7,248	6,592
Total other private										
Roundwood supplies[1]	126	126	181	200	284	291	362	458	420	420
Timber removals[2]	166	209	225	226	302	297	366	459	418	416
Net annual growth	251	292	429	462	453	424	360	338	339	346
Inventory[4]	8,006	8,968	9,829	11,145	13,389	13,843	14,642	14,259	13,605	12,763
All ownerships										
Roundwood supplies[1]	143	145	223	258	368	360	442	547	494	494
Timber removals[2]	189	239	277	291	390	367	446	549	493	488
Net annual growth	307	357	534	576	573	551	468	430	424	428
Inventory[4]	9,790	10,966	12,346	14,144	17,055	17,552	18,727	18,489	17,986	17,255

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.1). Data are averages for 5 years centered on the projection year.

[4] Data from 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

[5] Includes lands under long-term lease from other private owners.

[6] Data for these and other private ownerships are not available for the years 1952, 1962, and 1970.

Note: Data may not add to totals because of rounding.

Table 3.63—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in the Southeast region, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	—	2	4	9	15	24	28	29
Timber removals[2]	—	—	—	3	6	9	15	24	28	29
Net annual growth	—	5	8	12	18	13	18	27	33	33
Inventory[4]	9	46	95	142	250	143	182	210	245	291
Natural pine										
Roundwood supplies[1]	172	124	168	156	171	213	160	97	69	61
Timber removals[2]	228	205	231	208	212	218	161	98	69	61
Net annual growth	207	185	201	209	190	169	100	66	63	62
Inventory[4]	4,075	3,669	3,695	3,643	3,668	2,422	1,784	1,110	824	782
Mixed pine–hardwoods										
Roundwood supplies[1]	11	13	42	116	160	291	248	178	195	197
Timber removals[2]	14	21	58	155	196	297	251	179	195	195
Net annual growth	108	157	217	254	223	189	199	209	203	189
Inventory[4]	2,533	3,693	4,671	5,217	5,289	4,355	3,792	3,546	3,800	3,828
Upland hardwoods										
Roundwood supplies[1]	196	242	250	326	530	616	790	978	1,060	1,039
Timber removals[2]	261	399	345	435	600	628	800	981	1,056	1,027
Net annual growth	541	692	973	1,155	1,184	1,102	945	872	868	894
Inventory[4]	16,487	20,527	24,925	29,167	34,419	35,286	39,158	40,051	38,563	36,611
Bottomland hardwoods										
Roundwood supplies[1]	386	260	306	166	269	412	485	557	595	587
Timber removals[2]	511	427	423	221	308	421	490	559	592	581
Net annual growth	436	429	447	556	590	591	495	486	504	514
Inventory[4]	14,517	14,697	14,803	16,843	19,353	21,490	22,149	21,832	20,991	20,016
All management types										
Roundwood supplies[1]	765	639	766	766	1,134	1,542	1,697	1,834	1,947	1,913
Timber removals[2]	1,014	1,052	1,057	1,022	1,322	1,573	1,718	1,840	1,940	1,893
Net annual growth	1,292	1,468	1,846	2,186	2,205	2,064	1,755	1,660	1,672	1,693
Inventory[4]	37,621	42,632	48,189	55,012	62,979	63,697	67,065	66,749	64,424	61,528

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.3). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.64—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in the South Central region, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year 1952	1962	1970	1976	1984	Projections[3] 1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	1	4	8	11	27	53	81	101	107
Timber removals[2]	—	1	5	10	11	26	52	80	99	104
Net annual growth	8	14	19	20	22	61	89	102	113	114
Inventory[4]	247	341	310	360	420	543	973	1,269	1,446	1,563
Natural pine										
Roundwood supplies[1]	74	85	93	126	168	195	135	103	98	88
Timber removals[2]	97	99	123	145	180	192	132	101	96	86
Net annual growth	113	127	148	183	150	147	94	90	83	80
Inventory[4]	2,909	3,324	3,334	3,424	3,460	2,901	2,143	1,751	1,630	1,497
Mixed pine–hardwoods										
Roundwood supplies[1]	118	131	123	148	233	384	500	301	215	226
Timber removals[2]	166	156	157	167	247	378	491	295	211	221
Net annual growth	208	204	280	340	309	340	233	237	273	245
Inventory[4]	5,239	5,295	5,905	6,901	7,498	8,061	6,591	4,459	4,274	4,893
Upland hardwoods										
Roundwood supplies[1]	378	412	366	372	516	733	722	957	1,075	1,034
Timber removals[2]	523	488	478	469	585	722	709	939	1,051	1,010
Net annual growth	653	736	906	960	974	941	744	655	655	723
Inventory[4]	16,325	17,956	20,008	22,758	27,032	27,691	29,088	28,072	24,618	20,709
Bottomland hardwoods										
Roundwood supplies[1]	416	462	404	387	431	465	602	712	745	716
Timber removals[2]	556	545	521	449	471	458	592	698	728	700
Net annual growth	587	563	669	702	597	548	446	458	511	554
Inventory[4]	15,898	16,714	16,150	16,978	17,629	22,526	22,495	20,473	17,840	15,655
All management types										
Roundwood supplies[1]	986	1,091	990	1,041	1,359	1,804	2,011	2,154	2,234	2,171
Timber removals[2]	1,342	1,289	1,284	1,240	1,494	1,776	1,976	2,113	2,184	2,121
Net annual growth	1,569	1,644	2,022	2,205	2,052	2,038	1,606	1,542	1,635	1,716
Inventory[4]	40,618	43,630	45,707	50,421	56,039	61,721	61,289	56,025	49,808	44,316

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.3). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.65—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Alabama, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year 1952	1962	1970	1976	1984	Projections[3] 1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	—	3	4	8	14	22	27	30
Timber removals[2]	—	—	—	4	4	8	14	21	27	29
Net annual growth	1	2	6	5	4	17	24	28	31	32
Inventory[4]	17	46	62	85	114	152	250	326	378	405
Natural pine										
Roundwood supplies[1]	11	14	18	34	66	68	29	19	17	14
Timber removals[2]	15	18	19	39	67	67	29	19	17	14
Net annual growth	20	23	33	40	29	28	19	19	17	16
Inventory[4]	547	701	835	835	681	429	200	144	145	146
Mixed pine–hardwoods										
Roundwood supplies[1]	5	7	23	61	114	162	104	48	28	30
Timber removals[2]	8	9	24	65	115	160	102	47	27	29
Net annual growth	34	43	69	68	56	58	37	38	44	39
Inventory[4]	907	1,292	1,618	1,642	1,506	1,115	539	150	217	370
Upland hardwoods										
Roundwood supplies[1]	54	67	78	72	89	133	172	221	224	201
Timber removals[2]	73	86	81	76	90	131	169	216	219	197
Net annual growth	91	100	145	172	181	171	139	125	127	141
Inventory[4]	2,455	2,996	3,393	4,071	5,100	5,064	4,950	4,324	3,458	2,562
Bottomland hardwoods										
Roundwood supplies[1]	86	105	93	73	73	70	94	104	90	80
Timber removals[2]	115	134	96	78	74	68	92	103	88	78
Net annual growth	96	92	119	87	56	51	41	44	53	59
Inventory[4]	2,552	2,747	2,793	2,856	2,929	3,356	2,924	2,353	1,902	1,573
All management types										
Roundwood supplies[1]	156	193	212	243	346	440	413	415	385	356
Timber removals[2]	211	247	220	262	350	434	406	406	376	348
Net annual growth	242	260	372	372	326	324	261	254	272	287
Inventory[4]	6,478	7,782	8,701	9,489	10,330	10,116	8,863	7,296	6,100	5,055

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.3). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.66—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Arkansas, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	—	1	2	5	7	9	12	13
Timber removals[2]	—	—	—	1	2	6	7	9	12	13
Net annual growth	5	4	3	3	3	7	11	12	14	14
Inventory[4]	123	102	71	81	89	93	151	201	230	250
Natural pine										
Roundwood supplies[1]	21	27	25	12	11	21	25	16	16	15
Timber removals[2]	24	31	44	16	14	21	25	16	16	15
Net annual growth	35	34	23	33	28	30	17	15	14	13
Inventory[4]	947	824	547	597	598	621	474	402	383	358
Mixed pine–hardwoods										
Roundwood supplies[1]	18	22	15	14	12	33	99	56	43	43
Timber removals[2]	21	26	27	18	15	33	97	55	42	42
Net annual growth	34	38	42	53	53	65	46	46	50	46
Inventory[4]	909	926	980	1,149	1,430	1,863	1,683	1,192	1,065	1,161
Upland hardwoods										
Roundwood supplies[1]	71	89	61	72	69	122	103	116	141	139
Timber removals[2]	81	105	106	95	87	120	101	113	138	136
Net annual growth	138	158	177	145	150	142	109	94	91	99
Inventory[4]	3,712	3,851	4,149	4,099	4,374	4,466	4,801	4,856	4,476	4,012
Bottomland hardwoods										
Roundwood supplies[1]	80	100	83	61	62	88	131	146	153	149
Timber removals[2]	90	118	144	80	77	86	129	144	149	146
Net annual growth	141	146	131	135	135	118	98	99	107	114
Inventory[4]	3,778	3,554	3,081	3,122	3,373	4,716	4,841	4,518	3,991	3,540
All management types										
Roundwood supplies[1]	190	238	184	160	156	269	365	343	365	360
Timber removals[3]	216	280	321	210	195	265	358	336	356	352
Net annual growth	353	380	376	369	369	363	280	266	275	286
Inventory[4]	9,469	9,257	8,828	9,048	9,864	11,758	11,949	11,170	10,145	9,321

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.3). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.67—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Florida, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	—	—	—	1	1	3	4	5
Timber removals[2]	—	—	—	—	1	1	1	3	4	5
Net annual growth	—	1	1	2	2	2	3	4	5	5
Inventory[4]	1	8	16	22	25	18	30	36	39	43
Natural pine										
Roundwood supplies[1]	14	9	9	4	7	13	7	6	5	5
Timber removals[2]	18	16	15	8	11	13	7	6	5	5
Net annual growth	12	9	7	9	9	8	5	4	5	5
Inventory[4]	289	209	184	182	171	102	82	61	48	49
Mixed pine–hardwoods										
Roundwood supplies[1]	—	1	1	7	9	21	12	10	12	12
Timber removals[2]	—	1	1	13	15	22	12	10	12	12
Net annual growth	5	8	13	17	18	13	12	12	12	12
Inventory[4]	125	203	319	335	344	222	208	197	201	202
Upland hardwoods										
Roundwood supplies[1]	11	11	3	10	5	8	16	22	27	27
Timber removals[2]	15	18	6	22	7	9	16	22	27	27
Net annual growth	19	21	22	28	28	28	25	24	24	25
Inventory[4]	626	699	754	775	770	799	948	1,006	975	910
Bottomland hardwoods										
Roundwood supplies[1]	46	28	27	23	36	74	68	79	86	84
Timber removals[2]	61	46	48	40	61	76	68	79	85	84
Net annual growth	64	72	73	103	122	113	83	75	74	73
Inventory[4]	2,476	2,882	2,985	3,386	3,798	3,988	3,928	3,859	3,684	3,541
All management types										
Roundwood supplies[1]	71	49	40	44	57	118	104	120	134	133
Timber removals[2]	94	81	70	83	95	120	105	120	134	131
Net annual growth	100	111	116	159	179	164	127	119	119	119
Inventory[4]	3,517	4,001	4,258	4,700	5,108	5,130	5,196	5,159	4,947	4,744

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.3). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.68–Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Georgia, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	—	1	1	2	4	5	7	7
Timber removals[2]	—	—	—	1	1	2	4	5	7	6
Net annual growth	—	1	2	3	4	3	4	6	7	7
Inventory[4]	3	14	31	44	55	36	41	43	45	54
Natural pine										
Roundwood supplies[1]	57	43	43	41	66	98	60	32	24	22
Timber removals[2]	77	69	62	66	97	100	60	32	24	21
Net annual growth	75	61	65	71	71	65	39	25	23	21
Inventory[4]	1,344	1,232	1,316	1,322	1,269	751	519	347	264	235
Mixed pine–hardwoods										
Roundwood supplies[1]	1	1	6	36	55	123	62	39	48	50
Timber removals[2]	1	1	9	56	81	125	63	40	48	49
Net annual growth	32	48	62	69	66	58	57	57	55	51
Inventory[4]	670	1,114	1,438	1,495	1,378	885	738	775	882	919
Upland hardwoods										
Roundwood supplies[1]	46	69	38	32	30	86	173	197	235	230
Timber removals[2]	61	114	56	65	71	87	175	198	234	227
Net annual growth	91	117	154	202	256	234	208	193	192	197
Inventory[4]	2,224	3,186	4,250	5,190	6,216	6,560	7,520	7,847	7,511	7,037
Bottomland hardwoods										
Roundwood supplies[1]	99	66	79	46	59	90	162	178	193	188
Timber removals[2]	131	110	121	70	65	92	164	178	192	187
Net annual growth	131	125	125	148	180	182	155	155	162	166
Inventory[4]	3,950	4,159	4,213	4,639	5,370	6,280	6,682	6,614	6,324	6,001
All management types										
Roundwood supplies[1]	203	179	166	156	211	399	462	452	506	496
Timber removals[2]	270	294	248	258	315	407	465	453	505	491
Net annual growth	329	352	408	493	577	541	462	436	438	443
Inventory[4]	8,191	9,705	11,248	12,690	14,288	14,511	15,500	15,627	15,025	14,245

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.3). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.69—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Louisiana, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year 1952	1962	1970	1976	1984	Projections[3] 1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	1	2	2	3	8	9	14	18	21
Timber removals[2]	—	1	2	3	3	8	9	14	18	20
Net annual growth	—	2	4	5	5	14	19	22	24	24
Inventory[4]	23	95	63	53	53	70	192	282	351	395
Natural pine										
Roundwood supplies[1]	12	11	9	12	16	27	25	20	17	16
Timber removals[2]	17	12	10	14	17	26	25	20	17	16
Net annual growth	6	9	22	27	26	26	16	16	15	15
Inventory[4]	206	528	578	585	681	558	450	359	340	322
Mixed pine–hardwoods										
Roundwood supplies[1]	2	2	10	11	16	36	60	41	30	32
Timber removals[2]	3	2	12	13	17	35	59	40	29	31
Net annual growth	16	13	36	45	42	44	32	34	39	37
Inventory[4]	554	756	859	957	912	978	880	668	652	754
Upland hardwoods										
Roundwood supplies[1]	11	11	17	15	16	38	38	60	62	68
Timber removals[2]	15	12	20	19	17	37	38	58	61	66
Net annual growth	27	17	34	43	39	60	56	53	55	63
Inventory[4]	939	964	929	966	1,366	1,468	1,811	1,912	1,888	1,796
Bottomland hardwoods										
Roundwood supplies[1]	115	111	101	109	128	163	139	136	180	186
Timber removals[2]	158	124	120	127	135	160	137	133	176	182
Net annual growth	145	107	157	199	184	157	124	122	133	147
Inventory[4]	5,034	5,968	5,378	5,252	5,428	5,670	5,794	5,736	5,355	4,894
All management types										
Roundwood supplies[1]	140	136	139	149	179	272	271	270	307	322
Timber removals[2]	193	151	164	176	189	267	267	265	300	315
Net annual growth	194	148	253	319	296	302	248	247	267	286
Inventory[4]	6,756	8,311	7,807	7,813	8,440	8,744	9,128	8,956	8,586	8,161

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.3). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.70—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Mississippi, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	1	—	1	2	11	18	23	24
Timber removals[2]	—	—	1	—	1	2	10	18	23	23
Net annual growth	1	3	3	3	3	14	19	21	24	24
Inventory[4]	23	35	51	64	85	116	210	266	280	285
Natural pine										
Roundwood supplies[1]	19	21	18	31	38	36	25	24	24	21
Timber removals[2]	25	23	22	34	42	36	24	24	23	21
Net annual growth	27	30	30	38	37	32	23	22	20	18
Inventory[4]	512	518	544	625	610	537	469	412	381	332
Mixed pine–hardwoods										
Roundwood supplies[1]	40	44	31	29	33	49	111	74	51	52
Timber removals[2]	54	49	40	32	37	49	109	72	49	51
Net annual growth	55	52	53	80	80	90	55	54	61	54
Inventory[4]	1,019	898	950	1,329	1,713	1,995	1,743	1,043	942	1,057
Upland hardwoods										
Roundwood supplies[1]	86	96	92	67	112	122	88	133	147	140
Timber removals[2]	117	106	116	73	124	120	87	130	143	137
Net annual growth	137	160	166	139	139	140	104	87	86	94
Inventory[4]	2,542	2,745	2,983	3,546	3,823	3,507	3,800	3,596	3,051	2,385
Bottomland hardwoods										
Roundwood supplies[1]	86	96	75	93	114	94	139	193	191	180
Timber removals[2]	118	106	94	102	126	92	136	189	187	176
Net annual growth	122	122	120	164	164	141	116	121	137	146
Inventory[4]	2,274	2,086	2,161	2,741	3,199	4,713	4,929	4,364	3,682	3,146
All management types										
Roundwood supplies[1]	231	257	217	220	298	303	373	442	436	418
Timber removals[2]	314	284	273	241	330	298	367	433	426	408
Net annual growth	342	367	372	424	423	416	317	305	328	336
Inventory[4]	6,370	6,282	6,689	8,305	9,430	10,867	11,150	9,681	8,337	7,206

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.3). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.71—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in North Carolina, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year: 1952	1962	1970	1976	1984	Projections: 1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	—	—	1	1	4	7	9	10
Timber removals[2]	—	—	—	1	1	2	4	7	9	10
Net annual growth	—	1	2	2	4	4	6	9	11	11
Inventory[4]	1	6	15	23	60	46	65	85	101	113
Natural pine										
Roundwood supplies[1]	41	30	52	52	45	49	43	25	16	13
Timber removals[2]	54	49	76	69	48	50	43	25	16	13
Net annual growth	53	57	60	58	54	45	25	16	14	14
Inventory[4]	1,036	1,016	991	908	1,013	702	520	280	184	180
Mixed pine–hardwoods										
Roundwood supplies[1]	6	6	23	33	46	77	73	47	56	55
Timber removals[2]	8	12	33	44	49	78	74	48	55	55
Net annual growth	36	48	59	68	66	50	53	57	55	51
Inventory[4]	887	1,110	1,255	1,387	1,585	1,327	1,115	1,007	1,058	1,039
Upland hardwoods										
Roundwood supplies[1]	72	68	52	53	172	209	241	266	321	314
Timber removals[2]	96	112	85	80	182	212	244	266	321	311
Net annual growth	165	209	280	357	355	320	281	266	269	279
Inventory[4]	5,195	6,054	7,473	9,100	10,458	10,521	11,563	12,013	11,627	11,109
Bottomland hardwoods										
Roundwood supplies[1]	79	62	84	47	66	94	128	142	156	156
Timber removals[2]	104	101	120	59	70	97	130	143	156	155
Net annual growth	103	110	122	139	148	154	134	132	137	140
Inventory[4]	3,593	3,572	3,660	3,971	4,595	5,323	5,626	5,650	5,493	5,237
All management types										
Roundwood supplies[1]	198	166	211	185	330	430	490	487	559	549
Timber removals[2]	262	274	314	253	350	439	494	489	557	543
Net annual growth	357	425	523	624	627	573	499	480	487	494
Inventory[4]	10,712	11,758	13,394	15,389	17,711	17,919	18,888	19,035	18,463	17,679

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.3). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.72—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Oklahoma, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	—	—	—	—	1	2	2	2
Timber removals[2]	—	—	—	—	—	—	1	1	2	2
Net annual growth	1	1	1	—	—	1	2	2	2	2
Inventory[4]	14	12	13	13	2	4	7	11	15	17
Natural pine										
Roundwood supplies[1]	1	1	1	1	3	5	2	2	2	2
Timber removals[2]	2	1	2	2	3	5	2	2	2	2
Net annual growth	2	3	3	5	3	2	1	2	2	2
Inventory[4]	51	47	52	51	67	44	27	24	21	19
Mixed pine–hardwoods										
Roundwood supplies[1]	2	2	2	2	3	8	6	4	4	4
Timber removals[2]	3	2	2	2	3	8	6	4	4	4
Net annual growth	4	4	5	7	4	4	3	4	4	4
Inventory[4]	81	79	96	105	111	95	68	55	57	63
Upland hardwoods										
Roundwood supplies[1]	15	12	12	9	15	21	21	25	26	24
Timber removals[2]	18	12	14	10	17	20	20	24	26	23
Net annual growth	23	26	29	37	24	23	17	15	15	16
Inventory[4]	539	495	570	616	784	719	700	637	526	409
Bottomland hardwoods										
Roundwood supplies[1]	3	2	3	3	6	6	14	15	14	13
Timber removals[2]	4	3	4	4	7	6	14	15	14	13
Net annual growth	6	10	14	12	8	8	7	8	9	9
Inventory[4]	155	194	261	267	258	465	416	343	279	229
All management types										
Roundwood supplies[1]	21	17	18	15	27	40	44	47	48	44
Timber removals[2]	27	18	22	18	30	39	43	46	47	43
Net annual growth	36	44	52	61	39	38	31	30	31	33
Inventory[4]	840	827	992	1,052	1,222	1,327	1,218	1,070	898	736

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.3). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.73—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in South Carolina, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	—	—	1	1	2	3	3	3
Timber removals[2]	—	—	—	—	1	1	2	3	3	3
Net annual growth	—	1	1	2	2	2	2	3	4	4
Inventory[4]	3	11	19	28	38	15	20	22	25	29
Natural pine										
Roundwood supplies[1]	24	17	25	23	21	25	23	17	12	11
Timber removals[2]	32	29	29	25	22	26	23	17	12	11
Net annual growth	31	28	31	37	25	24	15	10	10	11
Inventory[4]	548	512	547	607	604	435	348	236	177	162
Mixed pine–hardwoods										
Roundwood supplies[1]	1	1	1	21	17	29	31	22	24	22
Timber removals[2]	1	1	1	22	17	29	31	22	23	22
Net annual growth	13	24	35	44	28	24	23	24	23	22
Inventory[4]	258	514	736	852	797	680	533	442	445	451
Upland hardwoods										
Roundwood supplies[1]	5	11	4	34	56	69	58	77	92	88
Timber removals[2]	7	1	85	44	57	70	59	77	92	87
Net annual growth	43	65	92	118	84	82	73	71	73	77
Inventory[4]	1,051	1,668	2,267	2,683	2,815	2,822	3,156	3,233	3,089	2,939
Bottomland hardwoods										
Roundwood supplies[1]	120	71	96	45	73	111	91	111	120	117
Timber removals[2]	158	116	113	46	75	114	92	111	120	116
Net annual growth	112	105	106	133	110	105	86	87	93	97
Inventory[4]	3,551	3,497	3,374	3,919	4,563	4,633	4,696	4,507	4,267	4,023
All management types										
Roundwood supplies[1]	150	100	126	123	168	235	204	229	251	241
Timber removals[2]	199	164	148	137	172	240	206	230	251	239
Net annual growth	199	223	265	334	249	235	199	195	203	210
Inventory[4]	5,411	6,202	6,943	8,089	8,817	8,584	8,753	8,439	8,003	7,604

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[4] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.3). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.74—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Tennessee, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year 1952	1962	1970	1976	1984	Projections[3] 1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	—	—	—	—	3	5	6	7
Timber removals[2]	—	—	—	—	—	—	3	4	6	6
Net annual growth	—	—	—	2	4	3	5	6	6	6
Inventory[4]	7	8	9	25	30	39	56	71	76	79
Natural pine										
Roundwood supplies[1]	3	2	2	6	9	10	5	5	6	6
Timber removals[2]	4	3	3	9	11	10	5	5	6	6
Net annual growth	5	6	10	5	3	6	5	5	5	5
Inventory[4]	126	156	189	161	141	124	102	102	103	100
Mixed pine–hardwoods										
Roundwood supplies[1]	27	25	18	13	19	35	53	36	28	30
Timber removals[2]	42	31	25	19	23	34	52	35	27	29
Net annual growth	28	25	32	31	30	30	27	30	36	32
Inventory[4]	716	633	559	627	709	798	695	592	629	724
Upland hardwoods										
Roundwood supplies[1]	126	118	84	113	177	254	259	347	403	388
Timber removals[2]	195	143	116	171	210	250	255	340	393	379
Net annual growth	206	242	298	350	370	346	274	243	243	267
Inventory[4]	5,240	6,083	6,903	8,074	9,692	10,490	10,927	10,706	9,452	8,111
Bottomland hardwoods										
Roundwood supplies[1]	30	28	28	16	15	18	28	32	32	30
Timber removals[2]	46	34	39	25	18	18	27	31	31	30
Net annual growth	37	37	66	24	8	20	15	17	20	22
Inventory[4]	934	938	937	911	857	1,171	1,071	940	795	708
All management types										
Roundwood supplies[1]	186	173	132	148	220	317	348	425	475	460
Timber removals[2]	287	211	183	224	262	312	343	416	463	450
Net annual growth	276	310	406	412	415	406	326	300	311	339
Inventory[4]	7,023	7,818	8,597	9,798	11,429	12,623	12,852	12,412	11,055	9,723

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.3). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.75—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Texas, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	1	2	1	3	7	12	12	11
Timber removals[2]	—	—	2	2	1	3	7	11	12	11
Net annual growth	—	2	2	2	3	6	10	11	13	13
Inventory[4]	40	43	41	39	47	69	107	112	115	132
Natural pine										
Roundwood supplies[1]	7	9	20	30	25	28	22	17	16	13
Timber removals[2]	10	11	23	31	26	27	22	17	16	13
Net annual growth	18	22	27	35	24	22	13	12	11	10
Inventory[4]	520	550	589	570	682	588	419	307	254	219
Mixed pine–hardwoods										
Roundwood supplies[1]	24	29	24	18	36	60	68	43	33	35
Timber removals[2]	35	37	27	18	37	59	66	42	33	34
Net annual growth	37	29	43	56	44	49	32	32	37	33
Inventory[4]	1,053	711	843	1,092	1,117	1,216	982	757	713	762
Upland hardwoods										
Roundwood supplies[1]	15	19	22	24	38	45	40	58	74	72
Timber removals[2]	24	24	25	25	40	44	39	57	72	71
Net annual growth	31	33	57	74	71	59	44	38	38	42
Inventory[4]	898	822	1,081	1,386	1,893	1,982	2,104	2,045	1,770	1,435
Bottomland hardwoods										
Roundwood supplies[1]	16	20	21	32	33	28	58	84	85	77
Timber removals[2]	25	26	24	33	34	28	57	83	83	76
Net annual growth	40	49	62	81	42	52	45	47	53	56
Inventory[4]	1,171	1,227	1,539	1,829	1,585	2,431	2,516	2,219	1,835	1,566
All management types										
Roundwood supplies[1]	62	77	88	106	133	164	194	214	220	209
Timber removals[2]	94	98	101	109	138	161	191	210	215	204
Net annual growth	126	135	191	248	184	188	143	140	151	155
Inventory[4]	3,682	3,353	4,093	4,916	5,324	6,286	6,129	5,441	4,687	4,114

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.3). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

Table 3.76—Hardwood roundwood supplies,[1] timber removals,[2] net annual growth, and inventory of hardwood growing stock in Virginia, by forest management type, selected years 1952–84, with projections[3] to 2030

Million cubic feet

Forest management type and item	Year					Projections[3]				
	1952	1962	1970	1976	1984	1990	2000	2010	2020	2030
Pine plantations										
Roundwood supplies[1]	—	—	—	1	1	3	4	6	5	5
Timber removals[2]	—	—	—	1	2	3	4	6	5	5
Net annual growth	—	1	2	3	6	2	3	6	7	7
Inventory[4]	1	7	14	25	72	28	25	24	36	53
Natural pine										
Roundwood supplies[1]	36	25	39	36	32	28	28	18	11	11
Timber removals[2]	47	42	49	40	34	29	28	18	11	11
Net annual growth	36	30	38	34	31	27	16	11	11	11
Inventory[4]	858	700	657	624	611	433	316	187	152	156
Mixed pine–hardwoods										
Roundwood supplies[1]	3	4	11	19	33	42	70	59	56	58
Timber removals[2]	4	6	14	20	34	43	70	60	56	57
Net annual growth	22	29	48	56	45	45	54	59	58	54
Inventory[4]	593	752	923	1,148	1,185	1,242	1,199	1,125	1,215	1,218
Upland hardwoods										
Roundwood supplies[1]	62	83	153	197	267	246	303	417	382	380
Timber removals[2]	82	137	193	224	283	250	306	418	382	376
Net annual growth	223	280	425	450	461	438	357	318	310	317
Inventory[4]	7,391	8,920	10,181	11,419	14,160	14,581	15,966	15,949	15,358	14,614
Bottomland hardwoods										
Roundwood supplies[1]	42	33	20	5	35	41	36	48	39	39
Timber removals[2]	56	54	2	16	37	42	37	48	39	39
Net annual growth	26	17	21	33	30	38	37	37	39	39
Inventory[4]	947	587	571	928	1,027	1,267	1,219	1,204	1,225	1,214
All management types										
Roundwood supplies[1]	143	145	223	258	368	360	442	547	494	494
Timber removals[2]	189	239	277	291	390	367	446	549	493	488
Net annual growth	307	357	534	576	573	551	468	430	424	428
Inventory[4]	9,790	10,966	12,346	14,144	17,055	17,552	18,727	18,489	17,986	17,255

[1] Includes roundwood harvested from growing stock and other sources such as salvable dead trees; rough and rotten trees; and trees on forest land other than timberland, in fence rows, and in urban areas.

[2] Includes removals in the form of roundwood products, logging residues, the volumes of timber removed in cultural operations such as noncommercial thinning, and inventory losses resulting from the diversion of timberland to other uses such as cropland, pastureland, parks, and urban uses.

[3] All projections at equilibrium prices, i.e., the stumpage prices at which projected timber demands and supplies are equal (see appendix table 4.3). Data are averages for 5 years centered on the projection year.

[4] Data for 1952 and 1962 are as of December 31. Data for 1970 and all projection years are as of January 1. Data for 1976 and 1984 are as of January 1, 1977, and January 1, 1985.

Note: Data may not add to totals because of rounding.

[This page intentionally left blank.]

Appendix 4

Table 4.1—Simulated effects of selected futures on projected softwood roundwood supplies on all ownerships; net annual growth and inventories of growing stock by private ownership and region; and softwood stumpage price indexes, lumber production, plywood production, and pulpwood consumption, by region, in the South, selected years 1984–2030

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Softwood roundwood supplies												
	Million cubic feet											
Forest industry												
Southeast												
1984	689	689	689	689	689	689	689	689	689	689	689	689
1990	783	775	792	769	784	735	788	780	783	788	788	784
2000	1,002	999	1,024	969	1,010	904	1,013	980	984	996	984	1,001
2010	1,183	1,171	1,218	1,134	1,203	1,079	1,191	1,140	1,122	1,130	1,111	1,179
2020	1,345	1,335	1,410	1,289	1,374	1,217	1,380	1,314	1,279	1,263	1,207	1,369
2030	1,427	1,398	1,501	1,329	1,455	1,273	1,480	1,378	1,315	1,335	1,243	1,454
South Central												
1984	985	985	985	985	985	985	985	985	985	985	985	985
1990	1,098	1,086	1,104	1,079	1,101	1,027	1,113	1,082	1,097	1,097	1,096	1,095
2000	1,209	1,178	1,233	1,147	1,202	1,012	1,207	1,168	1,181	1,186	1,156	1,212
2010	1,386	1,361	1,409	1,325	1,388	1,171	1,406	1,339	1,313	1,340	1,289	1,372
2020	1,626	1,573	1,637	1,562	1,630	1,281	1,639	1,566	1,486	1,537	1,430	1,606
2030	1,714	1,635	1,751	1,632	1,693	1,349	1,741	1,637	1,570	1,630	1,492	1,691
Other private												
Southeast												
1984	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470
1990	1,470	1,456	1,496	1,432	1,465	1,453	1,483	1,479	1,471	1,463	1,463	1,472
2000	1,460	1,465	1,509	1,389	1,441	1,452	1,474	1,490	1,482	1,465	1,494	1,458
2010	1,415	1,416	1,477	1,319	1,383	1,410	1,427	1,515	1,507	1,526	1,644	1,413
2020	1,420	1,421	1,505	1,316	1,368	1,384	1,453	1,567	1,627	1,696	1,863	1,438
2030	1,428	1,414	1,527	1,284	1,354	1,361	1,473	1,576	1,661	1,798	1,964	1,445
South Central												
1984	1,374	1,374	1,374	1,374	1,374	1,374	1,374	1,374	1,374	1,374	1,374	1,374
1990	1,495	1,503	1,523	1,449	1,493	1,507	1,511	1,514	1,496	1,489	1,489	1,495
2000	1,605	1,612	1,656	1,507	1,591	1,600	1,622	1,659	1,641	1,618	1,652	1,603
2010	1,610	1,615	1,676	1,480	1,591	1,442	1,639	1,708	1,735	1,708	1,816	1,607
2020	1,618	1,600	1,685	1,466	1,587	1,320	1,646	1,714	1,808	1,784	1,947	1,607
2030	1,585	1,547	1,668	1,413	1,541	1,314	1,622	1,681	1,817	1,790	1,978	1,569

Table 4.1—Simulated effects of selected futures on projected softwood roundwood supplies on all ownerships; net annual growth and inventories of growing stock by private ownership and region; and softwood stumpage price indexes, lumber production, plywood production, and pulpwood consumption, by region, in the South, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Softwood roundwood supplies	*Million cubic feet*											
National forest												
Southeast												
1984	110	110	110	110	110	110	110	110	110	110	110	110
1990	110	110	110	110	110	110	91	110	110	110	110	110
2000	110	110	110	110	110	110	88	110	110	110	110	110
2010	110	110	110	110	110	110	88	110	110	110	110	110
2020	110	110	110	110	110	110	88	110	110	110	110	110
2030	110	110	110	110	110	110	88	110	110	110	110	110
South Central												
1984	188	188	188	188	188	188	188	188	188	188	188	188
1990	187	187	187	187	187	187	155	187	187	187	187	187
2000	205	205	205	205	205	205	164	205	205	205	205	205
2010	221	221	221	221	221	221	177	221	221	221	221	221
2020	259	259	259	259	259	259	207	259	259	259	259	259
2030	289	289	289	289	289	289	231	289	289	289	289	289
Other public												
Southeast												
1984	85	85	85	85	85	85	85	85	85	85	85	85
1990	100	100	100	100	100	100	100	100	100	100	100	100
2000	104	104	104	104	104	104	104	104	104	104	104	104
2010	106	106	106	106	106	106	106	106	106	106	106	106
2020	109	109	109	109	109	109	109	109	109	109	109	109
2030	114	114	114	114	114	114	114	114	114	114	114	114
South Central												
1984	50	50	50	50	50	50	50	50	50	50	50	50
1990	55	55	55	55	55	55	55	55	55	55	55	55
2000	61	61	61	61	61	61	61	61	61	61	61	61
2010	61	61	61	61	61	61	61	61	61	61	61	61
2020	61	61	61	61	61	61	61	61	61	61	61	61
2030	61	61	61	61	61	61	61	61	61	61	61	61

Table 4.1—Simulated effects of selected futures on projected softwood roundwood supplies on all ownerships; net annual growth and inventories of growing stock by private ownership and region; and softwood stumpage price indexes, lumber production, plywood production, and pulpwood consumption, by region, in the South, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Softwood net annual growth	*Million cubic feet*											
Forest industry												
Southeast												
1984	923	923	923	923	923	923	923	923	923	923	923	923
1990	1,164	1,164	1,164	1,164	1,164	938	1,164	1,164	1,164	1,167	1,167	1,164
2000	1,398	1,398	1,398	1,398	1,398	1,097	1,398	1,398	1,399	1,426	1,427	1,398
2010	1,585	1,585	1,585	1,585	1,586	1,242	1,585	1,581	1,583	1,625	1,626	1,585
2020	1,629	1,629	1,629	1,629	1,640	1,290	1,629	1,606	1,602	1,645	1,625	1,629
2030	1,636	1,636	1,636	1,636	1,653	1,330	1,636	1,611	1,597	1,623	1,581	1,636
South Central												
1984	1,001	1,001	1,001	1,001	1,001	1,001	1,001	1,001	1,001	1,001	1,001	1,001
1990	1,063	1,063	1,063	1,063	1,063	885	1,063	1,063	1,063	1,064	1,064	1,063
2000	1,354	1,354	1,354	1,354	1,355	1,079	1,354	1,353	1,355	1,376	1,376	1,354
2010	1,582	1,582	1,582	1,582	1,582	1,211	1,582	1,573	1,578	1,616	1,610	1,582
2020	1,717	1,717	1,717	1,717	1,722	1,312	1,717	1,697	1,697	1,742	1,720	1,717
2030	1,819	1,819	1,819	1,819	1,826	1,380	1,819	1,792	1,767	1,808	1,740	1,819
Other private												
Southeast												
1984	1,359	1,359	1,359	1,359	1,359	1,359	1,359	1,359	1,359	1,359	1,359	1,359
1990	1,288	1,288	1,288	1,288	1,263	1,061	1,288	1,336	1,330	1,325	1,368	1,288
2000	1,430	1,430	1,430	1,430	1,363	1,146	1,430	1,577	1,762	1,965	2,297	1,430
2010	1,570	1,570	1,570	1,570	1,468	1,262	1,570	1,829	2,108	2,422	2,963	1,570
2020	1,609	1,609	1,609	1,609	1,487	1,317	1,609	1,840	2,164	2,509	3,055	1,609
2030	1,613	1,613	1,613	1,613	1,478	1,358	1,613	1,806	2,075	2,343	2,777	1,613
South Central												
1984	1,480	1,480	1,480	1,480	1,480	1,480	1,480	1,480	1,480	1,480	1,480	1,480
1990	1,245	1,245	1,245	1,245	1,229	1,021	1,245	1,295	1,334	1,305	1,394	1,245
2000	1,430	1,430	1,430	1,430	1,385	1,154	1,430	1,586	2,053	2,042	2,664	1,430
2010	1,567	1,567	1,567	1,567	1,497	1,278	1,567	1,803	2,487	2,440	3,360	1,567
2020	1,610	1,610	1,610	1,610	1,531	1,317	1,610	1,799	2,429	2,405	3,186	1,610
2030	1,629	1,629	1,629	1,629	1,547	1,323	1,629	1,787	2,262	2,217	2,767	1,629

Table 4.1—Simulated effects of selected futures on projected softwood roundwood supplies on all ownerships; net annual growth and inventories of growing stock by private ownership and region; and softwood stumpage price indexes, lumber production, plywood production, and pulpwood consumption, by region, in the South, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Softwood inventory	*Million cubic feet*											
Forest industry												
Southeast												
1984	9,758	9,758	9,758	9,758	9,758	9,758	9,758	9,758	9,758	9,758	9,758	9,758
1990	10,115	10,131	10,058	10,200	10,108	8,901	10,105	10,125	10,115	10,066	10,066	10,112
2000	12,246	12,290	12,024	12,620	12,202	9,396	12,108	12,368	12,301	12,185	12,240	12,233
2010	14,765	14,906	14,287	15,700	14,583	9,947	14,541	15,287	15,170	15,292	15,680	14,814
2020	17,118	17,361	16,233	18,795	16,680	10,256	16,814	18,085	18,181	18,806	19,552	17,218
2030	18,648	19,130	17,271	21,237	18,105	10,332	18,157	19,860	20,442	21,504	22,774	18,784
South Central												
1984	15,117	15,117	15,117	15,117	15,117	15,117	15,117	15,117	15,117	15,117	15,117	15,117
1990	14,228	14,251	14,193	14,356	14,218	13,500	14,201	14,313	14,228	14,236	14,236	14,275
2000	13,145	13,262	12,967	13,446	13,078	11,792	12,936	13,506	13,230	13,172	13,258	13,147
2010	14,383	14,675	13,977	15,179	14,270	12,046	14,050	15,185	14,889	14,947	15,426	14,374
2020	15,841	16,445	15,219	17,218	15,618	12,300	15,331	17,015	17,286	17,451	18,559	15,943
2030	17,019	18,067	16,112	19,042	16,630	12,705	16,261	18,561	19,396	19,723	21,401	17,304
Other private												
Southeast												
1984	32,966	32,966	32,966	32,966	32,966	32,966	32,966	32,966	32,966	32,966	32,966	32,966
1990	31,054	31,085	30,873	31,332	30,843	29,257	31,030	31,424	31,054	30,481	30,482	31,050
2000	27,366	27,411	26,781	28,304	26,618	23,306	27,124	28,930	28,458	27,349	28,439	27,343
2010	26,059	26,077	24,923	27,990	24,610	19,205	25,687	30,509	30,420	30,827	35,215	26,095
2020	26,484	26,485	24,676	29,631	24,209	17,023	25,998	32,241	35,000	38,422	47,038	26,553
2030	27,427	27,540	24,860	31,941	24,424	15,946	26,746	33,895	38,950	44,520	56,385	27,524
South Central												
1984	29,243	29,243	29,243	29,243	29,243	29,243	29,243	29,243	29,243	29,243	29,243	29,243
1990	29,883	29,869	29,724	30,152	29,663	28,159	29,857	31,434	29,884	29,370	29,370	29,899
2000	26,487	26,357	25,959	27,369	25,846	22,308	26,252	30,966	28,825	27,398	29,736	26,503
2010	25,150	24,895	24,032	27,092	23,972	18,968	24,667	33,269	33,834	31,757	40,506	25,163
2020	24,965	24,747	23,185	28,272	23,112	18,241	24,209	34,298	41,704	39,434	56,336	25,033
2030	25,435	25,422	22,906	30,303	22,899	18,584	24,341	35,556	47,647	45,324	67,612	25,626

Table 4.1—Simulated effects of selected futures on projected softwood roundwood supplies on all ownerships; net annual growth and inventories of growing stock by private ownership and region; and softwood stumpage price indexes, lumber production, plywood production, and pulpwood consumption, by region, in the South, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Softwood sawtimber stumpage prices	*Index of prices 1984 = 100*											
Southeast												
1984	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1990	125.1	111.3	129.9	119.8	125.5	129.2	129.5	123.2	124.9	130.8	130.6	127.0
2000	200.7	175.1	201.3	190.1	201.6	216.3	223.3	184.4	188.6	198.2	193.5	199.3
2010	200.3	145.4	188.5	206.9	210.5	297.9	213.1	184.0	168.6	175.0	186.8	187.1
2020	229.7	170.8	242.1	240.6	250.0	396.8	271.9	225.7	220.7	207.1	191.0	248.1
2030	252.5	163.6	257.7	224.5	259.9	432.3	310.8	222.0	189.7	206.2	158.1	267.4
South Central												
1984	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1990	112.9	102.0	108.7	111.8	114.0	122.4	118.5	109.7	112.9	109.7	109.7	109.9
2000	166.2	134.0	169.1	149.8	161.3	198.7	168.4	156.2	162.3	158.4	152.7	167.9
2010	186.5	148.3	184.1	174.8	183.5	250.8	202.5	179.4	180.1	180.2	177.1	180.0
2020	237.8	177.4	228.5	220.5	236.2	317.4	254.9	218.4	202.0	208.2	180.6	225.2
2030	242.7	166.4	244.9	214.8	235.0	350.2	271.0	208.9	196.2	200.7	160.3	224.6
Softwood pulpwood stumpage prices												
Southeast												
1984	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1990	122.0	110.2	130.5	110.2	123.7	133.9	127.1	120.3	122.0	127.1	127.1	123.7
2000	181.4	172.9	200.0	152.5	186.4	235.6	200.0	164.4	169.5	179.7	171.2	181.4
2010	189.8	155.9	208.5	147.5	203.4	342.4	201.7	161.0	152.5	154.2	144.1	179.7
2020	201.7	171.2	247.5	145.8	225.4	449.2	227.1	171.2	161.0	144.1	116.9	208.5
2030	232.2	174.6	276.3	164.4	247.5	484.7	278.0	200.0	167.8	167.8	123.7	240.7
South Central												
1984	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1990	104.5	102.3	109.1	93.2	104.5	122.7	111.4	102.3	104.5	102.3	102.3	102.3
2000	154.5	145.5	172.7	122.7	154.5	245.5	161.4	143.2	150.0	150.0	145.5	156.8
2010	170.5	159.1	193.2	120.5	170.5	361.4	184.1	150.0	154.5	154.5	143.2	165.9
2020	179.5	165.9	213.6	115.9	181.8	479.5	193.2	154.5	143.2	145.5	118.2	175.0
2030	252.3	188.6	281.8	184.1	247.7	513.6	279.5	209.1	193.2	193.2	150.0	234.1

Table 4.1—Simulated effects of selected futures on projected softwood roundwood supplies on all ownerships; net annual growth and inventories of growing stock by private ownership and region; and softwood stumpage price indexes, lumber production, plywood production, and pulpwood consumption, by region, in the South, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Softwood lumber production	*Million board feet, lumber tally*											
Forest industry												
Southeast												
1984	4,657	4,657	4,657	4,657	4,657	4,657	4,657	4,657	4,657	4,657	4,657	4,657
1990	5,082	5,119	5,095	5,088	5,073	4,698	5,078	5,087	5,083	5,067	5,068	5,101
2000	5,839	6,106	5,820	5,872	5,836	4,911	6,074	5,850	5,853	5,860	5,949	5,848
2010	6,207	6,428	6,003	6,593	6,193	5,114	6,433	6,612	6,431	6,622	7,208	6,103
2020	7,118	7,348	6,878	7,850	7,019	5,662	7,542	8,024	8,104	8,615	9,424	7,343
2030	7,883	7,659	7,279	8,441	7,461	5,926	8,324	8,565	8,590	9,824	10,467	8,087
South Central												
1984	5,352	5,352	5,352	5,352	5,352	5,352	5,352	5,352	5,352	5,352	5,352	5,352
1990	6,628	6,697	6,475	6,657	6,637	6,277	6,627	6,657	6,629	6,382	6,382	6,417
2000	7,306	7,418	7,401	7,232	7,066	5,964	7,130	7,413	7,363	7,147	7,172	7,283
2010	8,183	8,332	8,554	8,393	8,010	5,931	8,011	8,627	8,571	8,263	8,888	8,234
2020	10,031	10,155	10,321	10,285	9,878	6,127	9,910	10,403	10,591	10,276	10,841	9,949
2030	10,662	10,674	11,034	10,831	10,510	6,579	10,767	10,913	11,415	11,182	11,629	10,624
Softwood plywood production	*Million square feet, 3/8-inch basis*											
Southeast												
1984	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951
1990	2,725	2,823	2,731	2,698	2,697	2,850	2,716	2,779	2,727	2,730	2,731	2,716
2000	2,815	3,047	2,593	2,930	2,592	2,914	2,463	2,952	2,872	2,718	2,759	2,744
2010	3,003	3,247	2,664	3,220	2,756	3,137	2,377	3,090	3,080	2,964	3,300	2,973
2020	3,190	3,676	3,070	3,547	3,014	3,174	2,783	3,087	3,653	3,247	3,586	3,189
2030	3,329	4,061	3,463	3,799	3,329	3,041	3,316	3,371	3,954	3,665	4,019	3,396
South Central												
1984	6,903	6,903	6,903	6,903	6,903	6,903	6,903	6,903	6,903	6,903	6,903	6,903
1990	6,552	6,698	6,667	6,554	6,550	6,227	6,539	6,551	6,552	6,926	6,926	6,931
2000	6,663	7,064	6,361	6,438	6,872	5,839	6,632	6,715	6,671	6,809	6,804	6,810
2010	6,853	7,940	5,375	6,726	6,888	4,708	7,300	6,999	6,965	7,530	7,230	6,407
2020	7,302	8,100	5,270	7,569	7,155	4,139	7,417	7,534	7,149	8,189	8,038	6,927
2030	7,915	8,129	5,932	8,463	7,108	5,186	7,816	7,942	7,968	8,926	9,091	7,261

Table 4.1—Simulated effects of selected futures on projected softwood roundwood supplies on all ownerships; net annual growth and inventories of growing stock by private ownership and region; and softwood stumpage price indexes, lumber production, plywood production, and pulpwood consumption, by region, in the South, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Softwood roundwood pulpwood consumption	*Million cubic feet*											
Southeast												
1984	1,103	1,103	1,103	1,103	1,103	1,103	1,103	1,103	1,103	1,103	1,103	1,103
1990	1,115	1,115	1,146	1,066	1,115	1,115	1,115	1,115	1,115	1,115	1,115	1,115
2000	1,145	1,185	1,235	1,031	1,153	1,214	1,125	1,141	1,143	1,147	1,145	1,144
2010	1,217	1,306	1,387	978	1,226	1,293	1,222	1,202	1,204	1,212	1,171	1,243
2020	1,249	1,355	1,463	934	1,258	1,352	1,257	1,216	1,177	1,187	1,103	1,255
2030	1,277	1,404	1,526	895	1,304	1,413	1,250	1,234	1,233	1,162	1,125	1,257
South Central												
1984	952	952	952	952	952	952	952	952	952	952	952	952
1990	977	1,012	1,026	910	978	1,004	978	976	977	987	987	983
2000	1,063	1,148	1,142	939	1,073	1,149	1,076	1,056	1,061	1,072	1,071	1,055
2010	1,118	1,212	1,245	900	1,125	1,248	1,114	1,076	1,085	1,112	1,075	1,121
2020	1,095	1,212	1,266	818	1,104	1,300	1,097	1,053	1,063	1,062	1,044	1,105
2030	1,080	1,208	1,280	765	1,108	1,284	1,078	1,061	1,049	1,051	1,021	1,092
Softwood plant byproduct consumption												
Southeast												
1984	456	456	456	456	456	456	456	456	456	456	456	456
1990	521	516	537	498	521	515	521	521	521	521	521	522
2000	637	583	633	604	627	546	664	642	639	636	639	638
2010	679	554	627	696	667	573	672	701	697	690	749	642
2020	748	591	689	805	737	596	737	798	856	849	977	739
2030	795	602	740	862	757	587	837	861	865	988	1,046	827
South Central												
1984	634	634	634	634	634	634	634	634	634	634	634	634
1990	703	650	693	703	702	663	702	705	703	688	688	695
2000	732	597	736	719	717	596	711	742	735	720	721	746
2010	751	592	744	768	741	533	759	816	807	770	833	746
2020	859	651	831	902	846	497	855	922	915	930	963	841
2030	910	672	882	946	864	536	914	931	966	982	1,030	888

Table 4.1—Simulated effects of selected futures on projected softwood roundwood supplies on all ownerships; net annual growth and inventories of growing stock by private ownership and region; and softwood stumpage price indexes, lumber production, plywood production, and pulpwood consumption, by region, in the South, selected years 1984–2030—Continued

[1] The future as described by the basic assumptions and other specified and implied assumptions underlying the projections in chapter 3.

[2] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by increasing softwood lumber and plywood yields by 25 percent instead of the 10 percent increase assumed in the 1979 Assessment and the Supplement. The increase in yields will be staged in the progression 9, 7, 5, 3, and 1 percent per decade.

[3] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by increasing the projected exports of lumber, plywood, and pulpwood (includes pulpwood and the pulpwood equivalent of pulp, paper, and board) by 20 percent in 1990, 40 percent in 2000, 60 percent in 2010, 80 percent in 2020, and 100 percent in 2030.

[4] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by increasing the projected imports of plywood, pulpwood (includes pulpwood and the pulpwood equivalent of pulp, paper, and board), and hardwood lumber and logs by 20 percent in 1990, 40 percent in 2000, 60 percent in 2010, 80 percent in 2020, and 100 percent in 2030.

[5] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by reducing the projected area in timberland in the South by 2 million acres in 1990, 5 million acres in 2000, and 11 million acres in 2030.

[6] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by reducing the net annual growth on pine plantations, natural pine, and mixed pine–hardwood stands shown in the empirical yield tables used in developing the base level projections by 25 percent.

[7] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by reducing timber harvests on the national forests to 8.1 billion board feet in 1990 and maintaining this level through 2030.

[8] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the marginal cropland and pasture in the South that would yield higher rates of return in pine plantations would naturally revert to timberland by 2000 (70 percent natural pine, 30 percent hardwoods in the Southeast; 40 percent natural pine, 60 percent hardwoods in the South Central region).

[9] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the marginal cropland and pasture in the South would be planted in pine.

[10] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the economic opportunities, except those involving intermediate stand treatment and those not involving area change and management types, for increasing timber supplies on timberland in private ownerships that yield 4 percent or more net of inflation or deflation would be utilized.

[11] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the economic opportunities, except those involving intermediate stand treatment and those not involving area change and management types, for increasing timber supplies on timberland in private ownerships that yield 4 percent or more net of inflation or deflation would be utilized, and all the marginal cropland and pasture would be planted in pine.

[12] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the economic opportunities to increase timber supplies on forest industry timberlands in the Douglas-fir region would be utilized.

Table 4.2—Simulated effects of selected futures on projected softwood roundwood supplies, net annual growth, and inventories of growing stock on private ownerships by section or region; softwood stumpage price indexes, softwood lumber and plywood production, and roundwood pulpwood consumption by section or region; and softwood lumber price indexes and imports in the United States, selected years 1984–2030

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Softwood roundwood supplies							*Million cubic feet*					
South												
1984	4,690	4,690	4,690	4,690	4,690	4,690	4,690	4,690	4,690	4,690	4,690	4,690
1990	5,091	5,044	5,149	4,974	5,090	4,924	5,146	5,094	5,091	5,086	5,086	5,096
2000	5,471	5,454	5,635	5,186	5,444	5,179	5,501	5,483	5,481	5,458	5,465	5,461
2010	5,715	5,693	5,873	5,379	5,682	5,244	5,792	5,801	5,792	5,824	6,048	5,640
2020	6,076	5,966	6,321	5,734	6,036	5,287	6,209	6,250	6,255	6,394	6,536	6,123
2030	6,178	6,069	6,532	5,669	6,069	5,321	6,390	6,367	6,459	6,621	6,775	6,179
North												
1984	731	731	731	731	731	731	731	731	731	731	731	731
1990	881	855	894	859	881	880	881	881	881	880	880	881
2000	1,083	1,036	1,115	1,033	1,083	1,083	1,083	1,084	1,083	1,083	1,083	1,083
2010	1,199	1,134	1,252	1,108	1,198	1,199	1,199	1,200	1,198	1,197	1,197	1,199
2020	1,298	1,223	1,375	1,174	1,298	1,298	1,298	1,300	1,298	1,295	1,295	1,298
2030	1,372	1,296	1,474	1,207	1,370	1,371	1,372	1,374	1,372	1,367	1,368	1,372
Rocky Mountain												
1984	332	332	332	332	332	332	332	332	332	332	332	332
1990	340	313	345	339	340	341	395	341	340	342	342	341
2000	426	371	424	426	429	463	451	422	423	431	430	419
2010	481	446	487	470	485	548	513	477	477	480	463	482
2020	522	497	523	497	524	605	549	510	507	504	490	507
2030	515	508	521	496	539	588	544	511	512	518	503	503
Pacific Northwest												
1984	1,412	1,412	1,412	1,412	1,412	1,412	1,412	1,412	1,412	1,412	1,412	1,412
1990	1,425	1,360	1,276	1,421	1,425	1,511	1,549	1,428	1,425	1,420	1,420	1,427
2000	1,306	1,149	1,140	1,305	1,309	1,410	1,414	1,303	1,305	1,312	1,310	1,335
2010	1,373	1,154	1,245	1,362	1,374	1,449	1,392	1,336	1,365	1,351	1,339	1,464
2020	1,409	1,216	1,384	1,370	1,415	1,452	1,353	1,369	1,353	1,343	1,289	1,544
2030	1,200	1,215	1,375	1,170	1,231	1,119	1,093	1,191	1,142	1,112	1,076	1,559
Pacific Southwest												
1984	343	343	343	343	343	343	343	343	343	343	343	343
1990	340	331	346	339	340	390	364	338	340	348	348	341
2000	361	356	359	367	365	370	364	361	361	361	361	356
2010	442	412	437	444	449	446	436	439	440	443	425	435
2020	490	473	483	497	504	509	484	486	487	489	486	484
2030	515	509	506	536	530	522	506	511	511	498	500	503

Table 4.2—Simulated effects of selected futures on projected softwood roundwood supplies, net annual growth, and inventories of growing stock on private ownerships by section or region; softwood stumpage price indexes, softwood lumber and plywood production, and roundwood pulpwood consumption by section or region; and softwood lumber price indexes and imports in the United States, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Softwood net annual growth						*Million cubic feet*						
South												
1984	4,763	4,763	4,763	4,763	4,763	4,763	4,763	4,763	4,763	4,763	4,763	4,763
1990	4,759	4,759	4,759	4,759	4,719	3,906	4,759	4,858	4,891	4,861	4,992	4,759
2000	5,612	5,612	5,612	5,612	5,500	4,476	5,612	5,914	6,569	6,810	7,764	5,612
2010	6,304	6,304	6,304	6,304	6,133	4,993	6,304	6,785	7,757	8,103	9,558	6,304
2020	6,565	6,565	6,565	6,565	6,381	5,236	6,565	6,941	7,892	8,301	9,587	6,565
2030	6,697	6,697	6,697	6,697	6,504	5,390	6,697	6,995	7,702	7,991	8,865	6,697
North												
1984	1,342	1,342	1,342	1,342	1,342	1,342	1,342	1,342	1,342	1,342	1,342	1,342
1990	1,362	1,363	1,362	1,363	1,362	1,362	1,362	1,362	1,362	1,362	1,362	1,362
2000	1,307	1,305	1,308	1,305	1,307	1,307	1,307	1,307	1,307	1,307	1,307	1,308
2010	1,241	1,234	1,245	1,233	1,241	1,241	1,241	1,241	1,241	1,241	1,241	1,241
2020	1,189	1,178	1,197	1,173	1,189	1,189	1,189	1,189	1,189	1,189	1,189	1,189
2030	1,159	1,148	1,168	1,136	1,159	1,159	1,159	1,159	1,159	1,159	1,159	1,159
Rocky Mountain												
1984	419	419	419	419	419	419	419	419	419	419	419	419
1990	424	425	424	424	424	424	424	424	424	424	424	424
2000	420	420	420	420	420	419	419	420	420	420	420	420
2010	411	411	411	411	411	410	410	411	411	411	411	411
2020	400	400	399	400	399	393	396	400	400	400	400	400
2030	385	388	385	388	384	371	379	386	387	386	387	386
Pacific Northwest												
1984	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296
1990	1,259	1,264	1,268	1,260	1,259	1,258	1,252	1,259	1,259	1,259	1,259	1,367
2000	1,196	1,229	1,246	1,197	1,196	1,168	1,162	1,198	1,196	1,197	1,197	1,406
2010	1,118	1,203	1,214	1,119	1,117	1,056	1,065	1,125	1,119	1,121	1,119	1,445
2020	1,013	1,168	1,156	1,023	1,012	904	946	1,033	1,023	1,029	1,038	1,469
2030	907	1,137	1,092	936	904	752	838	944	944	956	989	1,488
Pacific Southwest												
1984	375	375	375	375	375	375	375	375	375	375	375	375
1990	409	409	409	409	409	408	408	409	409	409	409	409
2000	459	461	459	459	459	456	457	460	459	459	459	459
2010	495	500	495	494	494	489	491	496	495	495	496	496
2020	515	528	517	512	511	501	509	518	516	517	518	518
2030	528	548	532	521	518	504	519	532	531	532	533	533

Table 4.2—Simulated effects of selected futures on projected softwood roundwood supplies, net annual growth, and inventories of growing stock on private ownerships by section or region; softwood stumpage price indexes, softwood lumber and plywood production, and roundwood pulpwood consumption by section or region; and softwood lumber price indexes and imports in the United States, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Softwood net annual growth	*Million cubic feet*											
South												
1984	87,084	87,084	87,084	87,084	87,084	87,084	87,084	87,084	87,084	87,084	87,084	87,084
1990	85,279	85,336	84,849	86,040	84,833	79,818	85,193	87,296	85,281	84,153	84,153	85,337
2000	79,244	79,319	77,730	81,739	77,744	66,802	78,419	85,770	82,814	80,104	83,674	79,226
2010	80,356	80,553	77,219	85,962	77,436	60,165	78,946	94,250	94,314	92,824	106,827	80,446
2020	84,408	85,038	79,314	93,917	79,618	57,820	82,351	101,640	112,171	114,113	141,485	84,747
2030	88,529	90,159	81,148	102,523	82,058	57,567	85,506	107,872	126,435	131,071	168,171	89,239
North												
1984	40,889	40,889	40,889	40,889	40,889	40,889	40,889	40,889	40,889	40,889	40,889	40,889
1990	44,809	44,845	44,731	44,931	44,806	44,809	44,806	44,806	44,809	44,806	44,809	44,806
2000	48,079	48,463	47,790	48,542	48,080	48,081	48,079	48,078	48,079	48,082	48,082	48,079
2010	49,300	50,174	48,636	50,385	49,303	49,303	49,300	49,292	49,301	49,312	49,313	49,300
2020	48,946	50,384	47,736	50,920	48,955	48,953	48,946	48,926	48,950	48,983	48,986	48,946
2030	47,547	49,584	45,586	50,680	47,566	47,559	47,547	47,507	47,551	47,622	47,623	47,547
Rocky Mountain												
1984	21,380	21,380	21,380	21,380	21,380	21,380	21,380	21,380	21,380	21,380	21,380	21,380
1990	21,624	21,678	21,612	21,630	21,624	21,605	21,543	21,625	21,624	21,619	21,619	21,618
2000	21,225	21,662	21,184	21,251	21,229	21,093	20,681	21,242	21,228	21,192	21,194	21,218
2010	19,929	20,828	19,919	20,029	19,917	19,299	19,124	20,048	20,005	19,931	19,967	19,969
2020	18,165	19,373	18,107	18,379	18,103	16,657	17,028	18,372	18,320	18,242	18,425	18,248
2030	16,127	17,538	15,998	16,642	15,972	13,779	14,695	16,439	16,438	16,331	16,629	16,342
Pacific Northwest												
1984	36,763	36,763	36,763	36,763	36,763	36,763	36,763	36,763	36,763	36,763	36,763	36,763
1990	35,025	35,140	35,260	35,026	35,025	35,019	34,822	35,026	35,025	35,023	35,023	35,657
2000	32,974	34,310	34,979	33,005	32,966	31,915	31,474	33,024	32,975	32,982	32,985	34,951
2010	30,570	34,307	34,767	30,614	30,549	28,180	28,038	30,822	30,606	30,649	30,592	34,667
2020	27,193	33,978	33,173	27,540	27,138	23,403	24,170	27,903	27,519	27,712	28,002	34,097
2030	23,827	33,386	30,690	24,677	23,648	18,825	20,787	24,997	24,929	25,289	26,339	33,554
Pacific Southwest												
1984	16,414	16,414	16,414	16,414	16,414	16,414	16,414	16,414	16,414	16,414	16,414	16,414
1990	16,482	16,501	16,446	16,484	16,482	16,469	16,440	16,483	16,482	16,476	16,476	16,428
2000	16,914	17,016	16,887	16,928	16,910	16,675	16,707	16,949	16,915	16,894	16,895	16,890
2010	17,586	17,834	17,577	17,528	17,512	17,193	17,290	17,638	17,589	17,574	17,583	17,590
2020	17,958	18,560	18,049	17,851	17,774	17,375	17,679	18,094	18,025	18,036	18,083	18,073
2030	18,339	19,223	18,490	18,071	17,953	17,447	17,988	18,511	18,452	18,499	18,566	18,543

Table 4.2—Simulated effects of selected futures on projected softwood roundwood supplies, net annual growth, and inventories of growing stock on private ownerships by section or region; softwood stumpage price indexes, softwood lumber and plywood production, and roundwood pulpwood consumption by section or region; and softwood lumber price indexes and imports in the United States, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Softwood sawtimber stumpage prices	*Index of prices 1984 = 100*											
South												
1984	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1990	118.7	106.4	118.7	115.6	119.4	125.6	123.7	116.1	118.5	119.7	119.5	117.9
2000	182.5	153.4	184.2	168.8	180.3	207.0	194.3	169.5	174.7	177.2	171.9	182.7
2010	193.0	146.9	186.2	189.9	196.2	273.0	207.5	181.6	174.7	177.8	181.6	183.3
2020	234.0	174.3	234.9	230.0	242.7	354.8	262.9	221.9	210.8	207.7	185.5	236.0
2030	247.3	165.1	250.9	219.4	246.7	388.9	289.8	215.1	193.2	203.3	159.3	244.7
North												
1984	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1990	144.1	132.8	144.6	143.1	144.0	144.0	144.0	144.0	144.0	144.0	144.0	144.0
2000	176.1	151.9	178.4	172.5	176.1	176.1	176.1	176.1	176.1	176.1	176.1	176.1
2010	198.0	164.1	203.2	189.3	198.0	198.0	198.0	198.0	198.0	197.9	197.9	198.0
2020	237.9	193.3	249.3	220.3	237.8	237.8	237.9	238.1	237.9	237.5	237.5	237.9
2030	288.2	230.3	312.6	255.3	287.9	288.0	288.2	288.7	288.1	287.2	287.2	288.2
Rocky Mountain												
1984	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1990	221.0	105.5	238.9	221.5	222.3	231.4	377.6	224.1	220.8	237.8	237.8	231.6
2000	540.1	301.3	534.3	533.9	542.3	669.9	672.4	520.3	530.3	552.2	546.5	524.1
2010	816.2	489.1	802.2	780.8	835.0	1,144.7	975.5	780.1	795.4	809.3	753.1	802.6
2020	1,136.1	723.4	1,085.6	1,055.5	1,162.8	1,760.2	1,334.3	1,046.2	1,044.0	1,039.4	954.6	1,067.0
2030	1,335.6	928.5	1,296.0	1,257.1	1,453.3	2,208.8	1,616.1	1,275.4	1,261.3	1,304.2	1,202.4	1,222.3
Pacific Northwest												
1984	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1990	112.6	102.6	99.2	112.3	112.6	116.6	138.7	112.5	112.6	112.5	112.5	108.7
2000	141.4	101.1	112.4	141.1	142.6	168.8	191.7	140.3	141.3	143.1	142.5	132.4
2010	187.9	115.0	143.5	184.2	188.8	237.8	237.5	179.2	185.2	183.4	179.1	166.3
2020	255.5	140.8	194.4	240.7	259.5	355.7	303.2	235.6	237.7	232.2	217.5	199.8
2030	298.0	157.5	228.9	270.9	304.5	446.4	350.1	270.9	259.6	246.8	219.8	210.7
Pacific Southwest												
1984	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1990	120.4	109.7	130.4	120.1	120.4	149.5	142.2	120.0	120.4	125.7	125.7	131.9
2000	177.8	148.9	175.3	181.9	183.4	202.6	191.7	174.8	177.6	178.0	177.2	173.5
2010	205.9	140.4	200.6	211.6	218.9	240.8	220.3	198.7	203.3	205.0	193.4	199.0
2020	226.8	141.1	211.0	244.8	259.9	299.0	243.4	211.3	217.4	216.8	211.0	208.7
2030	228.2	143.0	210.3	271.4	275.3	319.4	255.7	213.6	212.9	197.9	195.6	196.9

Table 4.2—Simulated effects of selected futures on projected softwood roundwood supplies, net annual growth, and inventories of growing stock on private ownerships by section or region; softwood stumpage price indexes, softwood lumber and plywood production, and roundwood pulpwood consumption by section or region; and softwood lumber price indexes and imports in the United States, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Softwood lumber production						*Million board feet, lumber tally*						
South												
1984	10,008	10,008	10,008	10,008	10,008	10,008	10,008	10,008	10,008	10,008	10,008	10,008
1990	11,710	11,816	11,569	11,745	11,710	10,975	11,705	11,744	11,712	11,449	11,450	11,518
2000	13,146	13,524	13,221	13,105	12,902	10,875	13,204	13,263	13,216	13,008	13,122	13,131
2010	14,390	14,760	14,557	14,987	14,203	11,045	14,444	15,239	15,003	14,885	16,097	14,337
2020	17,148	17,503	17,198	18,135	16,897	11,789	17,452	18,426	18,695	18,891	20,265	17,292
2030	18,545	18,333	18,313	19,272	17,971	12,505	19,091	19,477	20,005	21,006	22,096	18,711
North												
1984	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360
1990	1,807	1,807	1,807	1,807	1,807	1,807	1,807	1,807	1,807	1,807	1,807	1,807
2000	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908
2010	2,053	2,053	2,053	2,053	2,053	2,053	2,053	2,053	2,053	2,053	2,053	2,053
2020	2,198	2,198	2,198	2,198	2,198	2,198	2,198	2,198	2,198	2,198	2,198	2,198
2030	2,343	2,343	2,343	2,343	2,343	2,343	2,343	2,343	2,343	2,343	2,343	2,343
Rocky Mountain												
1984	4,163	4,163	4,163	4,163	4,163	4,163	4,163	4,163	4,163	4,163	4,163	4,163
1990	4,302	4,398	4,345	4,303	4,304	4,331	4,175	4,308	4,302	4,337	4,337	4,329
2000	4,737	4,959	4,783	4,741	4,763	4,852	4,471	4,707	4,730	4,767	4,759	4,744
2010	4,985	5,339	5,065	4,971	5,036	5,256	4,714	4,931	4,955	4,983	4,889	4,996
2020	5,239	5,650	5,263	5,170	5,273	5,510	4,874	5,063	5,082	5,040	4,965	5,125
2030	5,195	5,607	5,203	5,168	5,226	5,432	4,797	5,023	5,041	4,994	4,947	5,027
Pacific Northwest												
1984	10,913	10,913	10,913	10,913	10,913	10,913	10,913	10,913	10,913	10,913	10,913	10,913
1990	11,030	10,996	11,298	11,016	11,028	11,376	10,953	11,021	11,029	11,049	11,049	11,044
2000	10,754	10,579	11,702	10,740	10,780	11,517	10,521	10,725	10,745	10,778	10,766	10,916
2010	11,228	11,074	12,663	11,117	11,224	11,790	10,424	10,929	11,154	11,021	11,004	11,631
2020	11,507	11,651	13,746	11,224	11,534	11,790	10,214	11,228	11,112	11,031	10,604	12,230
2030	10,522	11,859	14,089	10,416	10,502	10,220	9,006	10,466	10,271	10,111	9,890	12,442
Pacific Southwest												
1984	3,982	3,982	3,982	3,982	3,982	3,982	3,982	3,982	3,982	3,982	3,982	3,982
1990	4,279	4,429	4,350	4,277	4,279	4,496	4,116	4,275	4,279	4,324	4,324	4,363
2000	4,572	4,908	4,554	4,611	4,614	4,645	4,177	4,565	4,570	4,565	4,559	4,533
2010	5,187	5,562	5,166	5,203	5,244	5,219	4,729	5,164	5,170	5,181	5,100	5,149
2020	5,613	6,179	5,588	5,685	5,740	5,727	5,154	5,588	5,590	5,597	5,588	5,572
2030	5,904	6,629	5,909	6,066	5,996	5,922	5,460	5,905	5,873	5,804	5,828	5,829

Table 4.2—Simulated effects of selected futures on projected softwood roundwood supplies, net annual growth, and inventories of growing stock on private ownerships by section or region; softwood stumpage price indexes, softwood lumber and plywood production, and roundwood pulpwood consumption by section or region; and softwood lumber price indexes and imports in the United States, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Softwood plywood production	*Million square feet, 3/8-inch basis*											
South												
1984	9,854	9,854	9,854	9,854	9,854	9,854	9,854	9,854	9,854	9,854	9,854	9,854
1990	9,277	9,521	9,398	9,252	9,247	9,077	9,255	9,331	9,279	9,656	9,657	9,647
2000	9,477	10,111	8,954	9,368	9,463	8,753	9,095	9,668	9,543	9,527	9,564	9,555
2010	9,856	11,187	8,039	9,946	9,645	7,845	9,676	10,088	10,045	10,494	10,530	9,381
2020	10,491	11,776	8,340	11,116	10,169	7,313	10,200	10,621	10,802	11,436	11,624	10,116
2030	11,244	12,190	9,395	12,262	10,437	8,227	11,132	11,313	11,923	12,591	13,109	10,657
North												
1984	63	63	63	63	63	63	63	63	63	63	63	63
1990	70	70	70	70	70	70	70	70	70	70	70	70
2000	80	80	80	80	80	80	80	80	80	80	80	80
2010	90	90	90	90	90	90	90	90	90	90	90	90
2020	100	100	100	100	100	100	100	100	100	100	100	100
2030	109	109	109	109	109	109	109	109	109	109	109	109
Rocky Mountain												
1984	1,043	1,043	1,043	1,043	1,043	1,043	1,043	1,043	1,043	1,043	1,043	1,043
1990	1,040	1,001	1,018	1,043	1,040	1,018	1,070	1,039	1,040	1,031	1,031	1,024
2000	1,403	1,436	1,283	1,381	1,360	1,606	1,327	1,396	1,382	1,380	1,375	1,332
2010	1,689	1,806	1,481	1,627	1,650	2,040	1,545	1,709	1,702	1,672	1,675	1,634
2020	1,848	2,033	1,619	1,810	1,841	2,522	1,747	1,986	1,923	1,961	1,901	1,887
2030	1,973	2,379	1,793	2,007	2,186	2,625	1,889	2,268	2,189	2,363	2,278	2,058
Pacific Northwest												
1984	7,939	7,939	7,939	7,939	7,939	7,939	7,939	7,939	7,939	7,939	7,939	7,939
1990	6,077	6,094	6,240	6,077	6,078	6,153	5,995	6,077	6,077	5,986	5,985	6,047
2000	5,352	5,501	6,480	5,362	5,359	5,335	5,299	5,354	5,354	5,391	5,393	5,465
2010	5,892	6,153	8,510	5,919	5,902	5,944	5,737	5,895	5,890	5,921	5,854	6,282
2020	6,423	6,800	9,725	6,436	6,475	6,611	6,150	6,452	6,424	6,416	6,473	7,037
2030	6,538	7,122	10,016	6,156	6,755	6,155	6,035	6,578	6,058	5,984	5,722	7,695
Pacific Southwest												
1984	349	349	349	349	349	349	349	349	349	349	349	349
1990	194	203	186	193	194	190	176	195	194	181	181	179
2000	217	236	193	215	215	216	226	217	218	217	217	211
2010	239	257	207	232	234	251	247	238	240	233	243	231
2020	281	267	227	255	254	298	299	273	273	268	258	251
2030	313	273	228	248	288	325	324	298	292	271	265	252

Table 4.2—Simulated effects of selected futures on projected softwood roundwood supplies, net annual growth, and inventories of growing stock on private ownerships by section or region; softwood stumpage price indexes, softwood lumber and plywood production, and roundwood pulpwood consumption by section or region; and softwood lumber price indexes and imports in the United States, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Softwood roundwood pulpwood consumption	*Million cubic feet*											
South												
1984	2,067	2,067	2,067	2,067	2,067	2,067	2,067	2,067	2,067	2,067	2,067	2,067
1990	2,092	2,127	2,173	1,976	2,093	2,119	2,093	2,091	2,092	2,102	2,102	2,097
2000	2,208	2,333	2,377	1,970	2,225	2,363	2,201	2,197	2,204	2,219	2,216	2,199
2010	2,336	2,518	2,632	1,878	2,351	2,540	2,336	2,277	2,290	2,324	2,246	2,364
2020	2,344	2,567	2,729	1,752	2,362	2,652	2,354	2,268	2,240	2,250	2,147	2,360
2030	2,357	2,612	2,805	1,659	2,412	2,698	2,329	2,295	2,282	2,212	2,146	2,348
North												
1984	379	379	379	379	379	379	379	379	379	379	379	379
1990	443	445	459	419	443	443	443	443	443	443	443	443
2000	531	533	565	476	531	531	531	532	531	531	531	531
2010	623	621	681	525	623	623	623	624	623	621	621	623
2020	712	705	795	579	711	712	712	714	712	708	708	712
2030	796	786	905	621	795	795	796	799	796	791	792	796
Rocky Mountain												
1984	31	31	31	31	31	31	31	31	31	31	31	31
1990	36	56	37	35	36	36	36	36	36	36	36	36
2000	44	74	46	40	44	44	44	44	44	44	44	44
2010	51	122	65	45	51	51	65	51	51	51	51	51
2020	68	155	98	50	67	59	88	73	74	74	81	72
2030	102	185	146	54	95	74	126	104	104	103	107	109
Pacific Northwest												
1984	203	203	203	203	203	203	203	203	203	203	203	203
1990	250	250	250	250	250	250	250	250	250	250	250	250
2000	251	251	251	250	251	251	251	251	251	251	251	251
2010	251	251	251	250	251	251	251	251	251	251	251	251
2020	251	251	157	250	251	251	251	251	251	251	251	251
2030	251	251	139	250	251	251	251	251	251	251	251	251
Pacific Southwest												
1984	1	1	1	1	1	1	1	1	1	1	1	1
1990	2	6	2	2	2	2	2	2	2	2	2	2
2000	2	33	2	2	2	2	5	2	2	2	2	2
2010	2	47	2	2	2	2	2	2	2	2	2	2
2020	2	42	2	2	2	2	2	2	2	2	2	2
2030	2	26	2	2	2	2	2	2	2	2	2	2

Table 4.2—Simulated effects of selected futures on projected softwood roundwood supplies, net annual growth, and inventories of growing stock on private ownerships by section or region; softwood stumpage price indexes, softwood lumber and plywood production, and roundwood pulpwood consumption by section or region; and softwood lumber price indexes and imports in the United States, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Softwood lumber prices												
	Index of prices 1967 = 100											
1984	116.3	116.3	116.3	116.3	116.3	116.3	116.3	116.3	116.3	116.3	116.3	116.3
1990	134.1	131.5	136.1	134.0	134.2	140.4	136.4	134.0	134.1	135.0	135.0	135.3
2000	152.6	142.7	152.1	152.7	153.7	161.2	158.0	152.0	152.3	153.5	152.7	151.7
2010	162.6	148.2	161.7	160.1	163.3	176.0	169.2	160.9	161.0	161.9	156.1	161.3
2020	176.1	154.1	172.5	171.1	177.8	200.4	183.4	170.0	169.3	168.6	162.3	170.8
2030	175.9	152.9	174.3	172.2	179.6	209.3	183.1	171.5	169.0	162.3	157.6	166.6
Softwood lumber imports												
	Million board feet, lumber tally											
1984	14,093	14,093	14,093	14,093	14,093	14,093	14,093	14,093	14,093	14,093	14,093	14,093
1990	15,320	15,164	15,341	15,303	15,315	15,218	15,500	15,299	15,320	15,382	15,382	15,316
2000	16,183	16,201	16,163	16,182	16,242	16,797	16,578	16,192	16,172	16,209	16,199	16,146
2010	15,082	15,308	14,991	14,802	15,122	16,600	16,098	14,761	14,721	14,914	14,298	14,889
2020	12,788	12,915	12,790	12,433	12,705	15,751	14,075	12,411	12,285	12,258	11,764	12,490
2030	11,748	11,090	11,058	11,221	12,021	15,720	13,138	11,267	11,130	10,935	10,371	10,535

[1] The future as described by the basic assumptions and other specified and implied assumptions underlying the projections in chapter 3.

[2] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by increasing softwood lumber and plywood yields by 25 percent instead of the 10-percent increase assumed in the 1979 Assessment and the Supplement. The increase in yields will be staged in the progression 9, 7, 5, 3, and 1 percent per decade.

[3] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by increasing the projected exports of lumber, plywood, and pulpwood (includes pulpwood and the pulpwood equivalent of pulp, paper, and board) by 20 percent in 1990, 40 percent in 2000, 60 percent in 2010, 80 percent in 2020, and 100 percent in 2030.

[4] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by increasing the projected imports of plywood, pulpwood (includes pulpwood and the pulpwood equivalent of pulp, paper, and board), and hardwood lumber and logs by 20 percent in 1990, 40 percent in 2000, 60 percent in 2010, 80 percent in 2020, and 100 percent in 2030.

[5] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by reducing the projected area in timberland in the South by 2 million acres in 1990, 5 million acres in 2000, and 11 million acres in 2030.

[6] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by reducing the net annual growth on pine plantations, natural pine, and mixed pine–hardwood stands shown in the empirical yield tables used in developing the base level projections by 25 percent.

[7] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by reducing timber harvests on the national forests to 8.1 billion board feet in 1990 and maintaining this level through 2030.

[8] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the marginal cropland and pasture in the South that would yield higher rates of return in pine plantations would naturally revert to timberland by 2000 (70 percent natural pine, 30 percent hardwoods in the Southeast; 40 percent natural pine, 60 percent hardwoods in the South Central).

[9] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the marginal cropland and pasture in the South would be planted in pine.

[10] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the economic opportunities, except those involving intermediate stand treatment and those not involving area change and management types, for increasing timber supplies on timberland in private ownerships that yield 4 percent or more net of inflation or deflation would be utilized.

[11] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the economic opportunities, except those involving intermediate stand treatment and those not involving area change and management types, for increasing timber supplies on timberland in private ownerships that yield 4 percent or more net of inflation or deflation would be utilized, and all the marginal cropland and pasture would be planted in pine.

[12] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the economic opportunities to increase timber supplies on forest industry timberlands in the Douglas-fir region would be utilized.

Table 4.3—Simulated effects of selected futures on projected hardwood roundwood supplies on all ownerships; net annual growth and inventories of growing stock by private ownership and region; and hardwood stumpage price indexes, lumber production, and pulpwood consumption, by region, in the South, selected years 1984–2030

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Hardwood roundwood supplies	*Million cubic feet*											
Forest industry												
Southeast												
1984	184		184	184	184	184		184	184	184	184	
1990	200		202	197	201	203		200	200	203	203	
2000	205		209	196	209	211		202	206	216	217	
2010	218		229	201	225	226		209	220	247	251	
2020	232		248	207	244	238		221	236	279	284	
2030	233		255	201	250	232		221	238	291	291	
South Central												
1984	303		303	303	303	303		303	303	303	303	
1990	333		339	322	335	333		328	333	337	337	
2000	348		361	330	353	351		332	350	364	366	
2010	359		384	328	369	362		327	365	399	404	
2020	372		400	322	389	374		333	368	415	405	
2030	365		399	303	389	365		323	346	396	379	
Other private												
Southeast												
1984	945		945	945	945	945		945	945	945	945	
1990	1,129		1,138	1,111	1,127	1,126		1,129	1,129	1,125	1,125	
2000	1,311		1,337	1,252	1,306	1,305		1,313	1,310	1,296	1,294	
2010	1,471		1,545	1,354	1,461	1,463		1,479	1,468	1,430	1,425	
2020	1,604		1,711	1,431	1,587	1,597		1,615	1,598	1,533	1,526	
2030	1,572		1,714	1,357	1,547	1,572		1,586	1,564	1,479	1,478	
South Central												
1984	1,040		1,040	1,040	1,040	1,040		1,040	1,040	1,040	1,040	
1990	1,163		1,183	1,124	1,161	1,162		1,169	1,163	1,158	1,158	
2000	1,368		1,421	1,297	1,360	1,362		1,391	1,365	1,344	1,342	
2010	1,528		1,632	1,399	1,512	1,520		1,579	1,518	1,465	1,456	
2020	1,645		1,762	1,436	1,617	1,634		1,716	1,647	1,564	1,575	
2030	1,628		1,760	1,371	1,588	1,615		1,712	1,654	1,552	1,581	

Table 4.3—Simulated effects of selected futures on projected hardwood roundwood supplies on all ownerships; net annual growth and inventories of growing stock by private ownership and region; and hardwood stumpage price indexes, lumber production, and pulpwood consumption, by region, in the South, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Hardwood roundwood supplies	*Million cubic feet*											
National forest												
Southeast												
1984	30		30	30	30	30		30	30	30	30	
1990	34		34	34	34	34		34	34	34	34	
2000	47		47	47	47	47		47	47	47	47	
2010	52		52	52	52	52		52	52	52	52	
2020	53		53	53	53	52		52	53	53	53	
2030	59		59	59	59	59		59	59	59	59	
South Central												
1984	23		23	23	23	23		23	23	23	23	
1990	25		25	25	25	25		25	25	25	25	
2000	29		29	29	29	29		29	29	29	29	
2010	36		36	36	36	36		36	36	36	36	
2020	46		46	46	46	46		46	46	46	46	
2030	41		41	41	41	41		41	41	41	41	
Other public												
Southeast												
1984	30		30	30	30	30		30	30	30	30	
1990	34		34	34	34	34		34	34	34	34	
2000	42		42	42	42	42		42	42	42	42	
2010	50		50	50	50	50		50	50	50	50	
2020	58		58	58	58	58		58	58	58	58	
2030	63		63	63	63	63		63	63	63	63	
South Central												
1984	49		49	49	49	49		49	49	49	49	
1990	59		59	59	59	59		59	59	59	59	
2000	70		70	70	70	70		70	70	70	70	
2010	79		79	79	79	79		79	79	79	79	
2020	84		84	84	84	84		84	84	84	84	
2030	88		88	88	88	88		88	88	88	88	

Table 4.3—Simulated effects of selected futures on projected hardwood roundwood supplies on all ownerships; net annual growth and inventories of growing stock by private ownership and region; and hardwood stumpage price indexes, lumber production, and pulpwood consumption, by region, in the South, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Hardwood net annual growth						*Million cubic feet*						
Forest industry												
Southeast												
1984	266		266	266	266	266		266	266	266	266	
1990	285		285	285	285	276		285	285	280	280	
2000	217		217	217	217	209		217	217	207	207	
2010	184		184	184	185	175		184	185	175	176	
2020	183		183	183	185	175		184	186	182	183	
2030	187		187	187	191	180		184	190	195	196	
South Central												
1984	507		507	507	507	507		507	507	507	507	
1990	439		439	439	439	412		439	439	438	437	
2000	307		307	307	307	286		306	306	301	300	
2010	255		255	255	256	238		251	253	248	247	
2020	256		253	253	259	242		247	257	258	260	
2030	277		277	277	284	265		261	282	295	300	
Other private												
Southeast												
1984	1,595		1,595	1,595	1,595	1,595		1,595	1,595	1,595	1,595	
1990	1,535		1,535	1,535	1,506	1,490		1,561	1,536	1,451	1,453	
2000	1,317		1,317	1,317	1,248	1,263		1,389	1,319	1,079	1,082	
2010	1,271		1,271	1,271	1,174	1,208		1,400	1,280	887	894	
2020	1,294		1,294	1,294	1,162	1,226		1,423	1,309	912	920	
2030	1,317		1,317	1,317	1,172	1,267		1,432	1,347	1,025	1,047	
South Central												
1984	1,789		1,789	1,789	1,789	1,789		1,789	1,789	1,789	1,789	
1990	1,427		1,427	1,427	1,405	1,366		1,470	1,459	1,406	1,438	
2000	1,144		1,144	1,144	1,090	1,092		1,284	1,198	1,018	1,072	
2010	1,126		1,126	1,126	1,040	1,071		1,368	1,205	880	958	
2020	1,208		1,208	1,208	1,103	1,146		1,421	1,271	970	1,033	
2030	1,261		1,261	1,261	1,148	1,214		1,434	1,321	1,092	1,150	

Table 4.3—Simulated effects of selected futures on projected hardwood roundwood supplies on all ownerships; net annual growth and inventories of growing stock by private ownership and region; and hardwood stumpage price indexes, lumber production, and pulpwood consumption, by region, in the South, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Hardwood inventory	*Million cubic feet*											
Forest industry												
Southeast												
1984	8,653		8,653	8,653	8,653	8,653		8,653	8,653	8,653	8,653	
1990	9,235		9,232	9,258	9,231	9,157		9,236	9,235	9,157	9,157	
2000	9,523		9,494	9,601	9,495	9,315		9,539	9,523	9,248	9,246	
2010	9,197		9,098	9,400	9,120	8,848		9,281	9,184	8,575	8,552	
2020	8,665		8,436	9,072	8,508	8,161		8,861	8,645	7,616	7,557	
2030	8,131		7,718	8,820	7,867	7,525		8,437	8,089	6,569	6,495	
South Central												
1984	11,994		11,994	11,994	11,994	11,994		11,994	11,994	11,994	11,994	
1990	13,315		13,285	13,385	13,311	13,114		13,325	13,315	13,249	13,249	
2000	13,115		12,990	13,335	13,077	12,666		13,227	13,109	12,860	12,854	
2010	12,003		11,688	12,461	11,893	11,331		12,345	11,932	11,333	11,261	
2020	10,634		10,049	11,484	10,409	9,781		11,291	10,531	9,484	9,414	
2030	9,481		8,596	10,876	9,101	8,486		10,425	9,523	8,050	8,161	
Other private												
Southeast												
1984	44,679		44,679	44,679	44,679	44,679		44,679	44,679	44,679	44,679	
1990	48,759		48,734	48,889	48,286	48,376		49,078	48,759	47,356	47,357	
2000	50,800		50,612	51,291	49,058	49,963		52,255	50,823	45,196	45,221	
2010	49,942		49,273	51,293	46,895	48,628		53,414	50,018	39,075	39,156	
2020	47,380		45,817	50,153	42,962	45,500		52,068	47,592	33,090	33,302	
2030	44,572		41,798	49,232	38,521	42,107		50,384	45,034	27,432	27,824	
South Central												
1984	42,514		42,514	42,514	42,514	42,514		42,514	42,514	42,514	42,514	
1990	47,574		47,473	47,807	47,143	47,061		48,513	47,572	46,877	46,477	
2000	47,146		46,694	47,932	45,806	46,110		50,371	47,474	43,615	43,954	
2010	43,235		42,003	45,000	40,983	41,774		49,788	44,221	36,559	37,568	
2020	38,679		36,343	42,089	35,350	36,728		46,962	40,383	30,044	31,734	
2030	34,658		31,111	40,348	30,250	32,254		44,218	36,820	24,498	26,583	

Table 4.3—Simulated effects of selected futures on projected hardwood roundwood supplies on all ownerships; net annual growth and inventories of growing stock by private ownership and region; and hardwood stumpage price indexes, lumber production, and pulpwood consumption, by region, in the South, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Hardwood sawtimber stumpage prices	*Index of prices 1984 = 100*											
Southeast												
1984	100.0		100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	
1990	90.1		90.2	89.6	91.1	91.2		89.3	90.1	93.4	93.4	
2000	81.4		82.2	79.9	85.1	83.5		77.9	82.2	95.2	95.9	
2010	95.3		97.8	90.9	103.0	98.6		85.4	98.7	132.2	135.9	
2020	114.9		121.4	105.2	129.2	120.4		98.2	118.8	177.8	180.0	
2030	122.2		133.7	105.9	144.5	131.7		98.5	122.6	201.8	197.7	
South Central												
1984	100.0		100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	
1990	89.5		89.8	89.0	90.4	91.0		87.6	89.5	91.8	91.8	
2000	80.1		81.2	78.3	82.7	82.7		73.4	81.0	89.3	90.2	
2010	97.6		100.9	93.0	103.1	101.8		82.1	100.7	122.3	124.8	
2020	119.3		126.6	109.4	129.5	126.1		96.1	120.1	156.9	155.0	
2030	129.8		141.9	113.4	145.4	140.0		99.8	124.1	173.7	163.9	
Hardwood lumber production	*Million board feet, lumber tally*											
Southeast												
1984	1,930		1,930	1,930	1,930	1,930		1,930	1,930	1,930	1,930	
1990	2,088		2,088	2,088	2,086	2,087		2,088	2,088	2,083	2,083	
2000	2,130		2,131	2,131	2,124	2,130		2,126	2,130	2,105	2,105	
2010	2,204		2,204	2,206	2,188	2,202		2,199	2,200	2,126	2,121	
2020	2,301		2,299	2,311	2,270	2,298		2,299	2,289	2,140	2,125	
2030	2,326		2,318	2,345	2,270	2,316		2,335	2,308	2,080	2,067	
South Central												
1984	2,384		2,384	2,384	2,384	2,384		2,384	2,384	2,384	2,384	
1990	2,530		2,529	2,532	2,526	2,521		2,538	2,530	2,521	2,521	
2000	2,626		2,620	2,636	2,610	2,605		2,674	2,625	2,580	2,580	
2010	2,708		2,688	2,736	2,672	2,672		2,831	2,684	2,555	2,534	
2020	2,765		2,715	2,832	2,694	2,711		2,975	2,751	2,505	2,511	
2030	2,657		2,566	2,785	2,536	2,564		2,948	2,710	2,343	2,433	

Table 4.3—Simulated effects of selected futures on projected hardwood roundwood supplies on all ownerships; net annual growth and inventories of growing stock by private ownership and region; and hardwood stumpage price indexes, lumber production, and pulpwood consumption, by region, in the South, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Hardwood roundwood pulpwood consumption						*Million cubic feet*						
Southeast												
1984	331		331	331	331	331		331	331	331	331	
1990	406		418	388	406	406		406	406	406	406	
2000	524		565	472	528	555		522	523	525	524	
2010	658		750	529	663	699		650	651	656	633	
2020	762		893	570	768	825		742	718	725	673	
2030	862		1,030	604	880	954		833	832	784	759	
South Central												
1984	549		549	549	549	549		549	549	549	549	
1990	638		670	594	638	655		637	638	645	645	
2000	812		872	717	819	878		806	810	819	818	
2010	964		1,073	776	970	1,076		927	936	959	927	
2020	1,035		1,197	774	1,044	1,229		995	1,005	1,004	987	
2030	1,102		1,306	780	1,131	1,310		1,082	1,070	1,072	1,042	
Hardwood plant byproduct consumption												
Southeast												
1984	99		99	99	99	99		99	99	99	99	
1990	115		118	110	115	121		115	115	115	115	
2000	122		122	116	121	120		122	122	120	120	
2010	121		122	123	120	119		121	121	117	118	
2020	125		125	120	123	122		125	125	117	116	
2030	126		125	128	122	120		127	126	114	114	
South Central												
1984	129		129	129	129	129		129	129	129	129	
1990	139		139	139	139	138		140	139	139	139	
2000	135		135	134	133	129		137	135	132	132	
2010	129		130	131	127	122		138	130	121	122	
2020	128		128	130	124	117		142	130	116	117	
2030	118		119	122	111	107		134	122	102	109	

Table 4.3—Simulated effects of selected futures on projected hardwood roundwood supplies on all ownerships; net annual growth and inventories of growing stock by private ownership and region; and hardwood stumpage price indexes, lumber production, and pulpwood consumption, by region, in the South, selected years 1984–2030—Continued

---

[1] The future as described by the basic assumptions and other specified and implied assumptions underlying the projections in chapter 3.

[2] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by increasing softwood lumber and plywood yields by 25 percent instead of the 10-percent increase assumed in the 1979 Assessment and the Supplement. The increase in yields will be staged in the progression 9, 7, 5, 3, and 1 percent per decade.

[3] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by increasing the projected exports of lumber, plywood, and pulpwood (includes pulpwood and the pulpwood equivalent of pulp, paper, and board) by 20 percent in 1990, 40 percent in 2000, 60 percent in 2010, 80 percent in 2020, and 100 percent in 2030.

[4] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by increasing the projected imports of plywood, pulpwood (includes pulpwood and the pulpwood equivalent of pulp, paper, and board), and hardwood lumber and logs by 20 percent in 1990, 40 percent in 2000, 60 percent in 2010, 80 percent in 2020, and 100 percent in 2030.

[5] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by reducing the projected area in timberland in the South by 2 million acres in 1990, 5 million acres in 2000, and 11 million acres in 2030.

[6] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by reducing the net annual growth on pine plantations, natural pine, and mixed pine–hardwood stands shown in the empirical yield tables used in developing the base level projections by 25 percent.

[7] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by reducing timber harvests on the national forests to 8.1 billion board feet in 1990 and maintaining this level through 2030.

[8] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the marginal cropland and pasture in the South that would yield higher rates of return in pine plantations would naturally revert to timberland by 2000 (70 percent natural pine, 30 percent hardwoods in the Southeast; 40 percent natural pine, 60 percent hardwoods in the South Central).

[9] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the marginal cropland and pasture in the South would be planted in pine.

[10] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the economic opportunities, except those involving intermediate stand treatment and those not involving area change and management types, for increasing timber supplies on timberland in private ownerships that yield 4 percent or more net of inflation or deflation would be utilized.

[11] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the economic opportunities, except those involving intermediate stand treatment and those not involving area change and management types, for increasing timber supplies on timberland in private ownerships that yield 4 percent or more net of inflation or deflation would be utilized, and all the marginal cropland and pasture would be planted in pine.

[12] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the economic opportunities to increase timber supplies on forest industry timberlands in the Douglas-fir region would be utilized.

Table 4.4—Simulated effects of selected futures on projected hardwood roundwood supplies, net annual growth, and inventories of growing stock on private ownerships by section or region; hardwood stumpage prices indexes, hardwood lumber and roundwood pulpwood consumption by section or region; and hardwood lumber price indexes in the United States, selected years 1984–2030

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Hardwood roundwood supplies						*Million cubic feet*						
Southeast												
1984	1,128		1,128	1,128	1,128	1,128		1,128	1,128	1,128	1,128	
1990	1,421		1,432	1,401	1,421	1,421		1,421	1,421	1,420	1,420	
2000	1,561		1,590	1,494	1,560	1,561		1,561	1,561	1,557	1,557	
2010	1,701		1,788	1,565	1,698	1,700		1,700	1,700	1,689	1,688	
2020	1,818		1,938	1,622	1,813	1,817		1,817	1,816	1,794	1,792	
2030	1,730		1,893	1,487	1,772	1,729		1,732	1,728	1,696	1,694	
South Central												
1984	1,344		1,344	1,344	1,344	1,344		1,344	1,344	1,344	1,344	
1990	1,590		1,615	1,536	1,589	1,588		1,591	1,590	1,588	1,588	
2000	1,769		1,836	1,679	1,767	1,766		1,777	1,769	1,762	1,762	
2010	1,901		2,033	1,741	1,895	1,895		1,919	1,897	1,877	1,874	
2020	1,993		2,136	1,737	1,983	1,985		2,024	1,991	1,955	1,956	
2030	1,912		2,074	1,599	1,895	1,899		1,953	1,920	1,868	1,881	
Northeast												
1984	586		586	586	586	586		586	586	586	586	
1990	693		753	728	693	693		593	693	693	693	
2000	838		887	825	839	839		837	838	840	840	
2010	983		1,037	919	984	984		981	984	988	988	
2020	1,172		1,195	1,020	1,174	1,173		1,168	1,173	1,180	1,180	
2030	1,304		1,297	1,054	1,306	1,305		1,298	1,303	1,313	1,312	
North Central												
1984	1,026		1,026	1,026	1,026	1,026		1,026	1,026	1,026	1,026	
1990	1,339		1,304	1,265	1,339	1,339		1,339	1,339	1,339	1,339	
2000	1,455		1,464	1,374	1,455	1,455		1,454	1,455	1,457	1,457	
2010	1,559		1,649	1,480	1,560	1,560		1,556	1,560	1,564	1,564	
2020	1,634		1,855	1,610	1,636	1,635		1,630	1,634	1,642	1,642	
2030	1,576		1,928	1,590	1,579	1,578		1,571	1,576	1,587	1,585	

Table 4.4—Simulated effects of selected futures on projected hardwood roundwood supplies, net annual growth, and inventories of growing stock on private ownerships by section or region; hardwood stumpage prices indexes, hardwood lumber and roundwood pulpwood consumption by section or region; and hardwood lumber price indexes in the United States, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Hardwood net annual growth	*Million cubic feet*											
Southeast												
1984	1,861		1,861	1,861	1,861	1,861		1,861	1,861	1,861	1,861	
1990	1,820		1,820	1,820	1,791	1,766		1,846	1,821	1,731	1,732	
2000	1,533		1,533	1,533	1,466	1,471		1,606	1,536	1,287	1,289	
2010	1,455		1,455	1,455	1,358	1,383		1,585	1,465	1,062	1,070	
2020	1,477		1,477	1,477	1,347	1,401		1,606	1,495	1,094	1,103	
2030	1,504		1,504	1,504	1,363	1,447		1,616	1,536	1,220	1,243	
South Central												
1984	2,295		2,295	2,295	2,295	2,295		2,295	2,295	2,295	2,295	
1990	1,867		1,867	1,867	1,845	1,778		1,909	1,898	1,844	1,875	
2000	1,451		1,451	1,451	1,397	1,378		1,590	1,504	1,319	1,372	
2010	1,381		1,318	1,381	1,296	1,309		1,619	1,458	1,128	1,205	
2020	1,464		1,464	1,464	1,362	1,388		1,668	1,528	1,229	1,294	
2030	1,538		1,538	1,538	1,432	1,480		1,695	1,603	1,387	1,450	
Northeast												
1984	1,609		1,609	1,609	1,609	1,609		1,609	1,609	1,609	1,609	
1990	1,512		1,512	1,512	1,512	1,512		1,512	1,512	1,512	1,512	
2000	1,297		1,297	1,297	1,297	1,297		1,297	1,297	1,297	1,297	
2010	1,179		1,179	1,179	1,179	1,179		1,179	1,179	1,179	1,179	
2020	1,157		1,157	1,157	1,157	1,157		1,157	1,157	1,157	1,157	
2030	1,157		1,157	1,157	1,157	1,157		1,157	1,157	1,157	1,157	
North Central												
1984	1,703		1,703	1,703	1,703	1,703		1,703	1,703	1,703	1,703	
1990	1,716		1,716	1,716	1,716	1,716		1,716	1,716	1,716	1,715	
2000	1,700		1,700	1,700	1,700	1,700		1,700	1,700	1,700	1,700	
2010	1,617		1,617	1,617	1,617	1,617		1,617	1,617	1,617	1,617	
2020	1,695		1,695	1,695	1,695	1,695		1,695	1,695	1,695	1,695	
2030	1,695		1,695	1,695	1,695	1,695		1,695	1,695	1,695	1,695	

Table 4.4—Simulated effects of selected futures on projected hardwood roundwood supplies, net annual growth, and inventories of growing stock on private ownerships by section or region; hardwood stumpage prices indexes, hardwood lumber and roundwood pulpwood consumption by section or region; and hardwood lumber price indexes in the United States, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Hardwood inventory						*Million cubic feet*						
Southeast												
1984	53,066		53,066	53,066	53,066	53,066		53,066	53,066	53,066	53,066	
1990	57,994		57,966	58,147	57,518	57,533		58,314	57,995	56,513	56,513	
2000	60,323		60,105	60,892	58,553	59,278		61,793	60,346	54,444	54,467	
2010	59,139		58,371	60,693	56,015	57,476		62,695	59,202	47,651	47,708	
2020	56,045		54,253	59,225	51,469	53,661		60,928	56,237	40,706	40,859	
2030	52,703		49,515	58,052	46,388	49,633		58,820	53,124	34,001	34,319	
South Central												
1984	54,508		54,508	54,508	54,508	54,508		54,508	54,508	54,508	54,508	
1990	60,889		60,758	61,192	60,454	60,175		61,838	60,887	59,726	59,727	
2000	60,261		59,684	61,268	58,883	58,776		63,598	60,583	56,475	56,808	
2010	55,238		53,691	57,460	52,876	53,105		62,134	56,153	47,892	48,829	
2020	49,312		46,392	53,573	45,759	46,510		58,254	50,914	39,528	41,148	
2030	44,139		39,707	51,224	39,352	40,740		54,644	46,343	32,548	34,743	
Northeast												
1984	65,000		65,000	65,000	65,000	65,000		65,000	65,000	65,000	65,000	
1990	71,506		71,180	71,327	71,506	71,506		71,506	71,506	71,506	71,506	
2000	79,043		78,170	78,736	79,041	79,039		79,048	79,043	79,036	79,036	
2010	82,978		81,595	83,036	82,969	82,969		82,997	82,975	82,945	82,942	
2020	84,077		82,296	85,182	84,055	84,059		84,126	84,069	83,986	83,978	
2030	83,326		81,451	86,397	83,281	83,295		83,418	83,316	83,149	83,145	
North Central												
1984	52,453		52,453	52,453	52,453	52,453		52,453	52,453	52,453	52,453	
1990	56,349		56,538	56,760	56,349	56,348		56,349	56,349	56,349	56,349	
2000	59,595		59,936	60,775	59,592	59,590		59,600	59,595	59,586	59,586	
2010	61,573		61,459	63,551	61,562	61,562		61,594	61,570	61,535	61,532	
2020	61,809		60,201	64,324	61,785	61,790		61,863	61,800	61,708	61,700	
2030	62,680		58,268	65,263	62,631	62,546		62,781	62,669	62,486	62,482	

Table 4.4—Simulated effects of selected futures on projected hardwood roundwood supplies, net annual growth, and inventories of growing stock on private ownerships by section or region; hardwood stumpage prices indexes, hardwood lumber and roundwood pulpwood consumption by section or region; and hardwood lumber price indexes in the United States, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Hardwood sawtimber stumpage prices	*Index of prices 1984 = 100*											
Southeast												
1984	100.0		100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	
1990	90.1		90.2	89.6	91.1	91.2		89.3	90.1	93.4	93.4	
2000	81.4		82.2	79.9	85.1	83.5		77.9	82.2	95.2	95.9	
2010	95.3		97.8	90.9	103.0	98.6		85.4	98.7	132.2	135.9	
2020	114.9		121.4	105.2	129.2	120.4		98.2	118.8	177.8	180.0	
2030	122.2		133.7	105.9	144.5	131.7		98.5	122.6	201.8	197.7	
South Central												
1984	100.0		100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	
1990	89.5		89.8	89.0	90.4	91.0		87.6	89.5	91.8	91.8	
2000	80.1		81.2	78.3	82.7	82.7		73.4	81.0	89.3	90.2	
2010	97.6		100.9	93.0	103.1	101.8		82.1	100.7	122.3	124.8	
2020	119.3		126.6	109.4	129.5	126.1		96.1	120.1	156.9	155.0	
2030	129.8		141.9	113.4	145.4	140.0		99.8	124.1	173.7	163.9	
Northeast												
1984	100.0		100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	
1990	90.0		90.6	90.2	90.1	90.2		89.8	90.0	90.3	90.3	
2000	82.2		83.6	82.4	82.5	82.4		81.5	82.2	83.2	83.2	
2010	84.6		87.0	84.0	85.2	85.0		83.2	84.9	87.4	87.7	
2020	91.6		95.1	88.9	92.6	92.2		89.4	91.8	96.0	96.0	
2030	97.7		102.0	91.7	99.3	98.7		94.8	97.3	102.9	102.2	
North Central												
1984	100.0		100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	
1990	93.3		92.9	92.3	93.4	93.4		93.1	93.3	93.5	93.5	
2000	92.6		92.0	89.9	92.9	92.9		92.0	92.7	93.6	93.6	
2010	98.5		99.0	93.9	99.0	98.9		97.1	98.8	101.2	101.4	
2020	107.1		111.6	100.7	108.2	107.7		105.0	107.3	111.4	111.4	
2030	110.8		121.9	103.5	112.4	111.7		108.0	110.4	116.0	115.3	

Table 4.4—Simulated effects of selected futures on projected hardwood roundwood supplies, net annual growth, and inventories of growing stock on private ownerships by section or region; hardwood stumpage prices indexes, hardwood lumber and roundwood pulpwood consumption by section or region; and hardwood lumber price indexes in the United States, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Hardwood lumber production						*Million board feet, lumber tally*						
Southeast												
1984	1,930		1,930	1,930	1,930	1,930		1,930	1,930	1,930	1,930	
1990	2,088		2,088	2,088	2,086	2,087		2,088	2,088	2,083	2,083	
2000	2,130		2,131	2,131	2,124	2,130		2,126	2,130	2,105	2,105	
2010	2,204		2,204	2,206	2,188	2,202		2,199	2,200	2,126	2,121	
2020	2,301		2,299	2,311	2,270	2,298		2,299	2,289	2,140	2,125	
2030	2,326		2,318	2,345	2,270	2,316		2,335	2,308	2,080	2,067	
South Central												
1984	2,384		2,384	2,384	2,384	2,384		2,384	2,384	2,384	2,384	
1990	2,530		2,529	2,532	2,526	2,521		2,538	2,530	2,521	2,521	
2000	2,626		2,620	2,636	2,610	2,605		2,674	2,625	2,580	2,580	
2010	2,708		2,688	2,736	2,672	2,672		2,831	2,684	2,555	2,534	
2020	2,765		2,715	2,832	2,694	2,711		2,975	2,751	2,505	2,511	
2030	2,657		2,566	2,785	2,536	2,564		2,948	2,710	2,343	2,433	
Northeast												
1984	1,418		1,418	1,418	1,418	1,418		1,418	1,418	1,418	1,418	
1990	1,523		1,521	1,521	1,523	1,524		1,522	1,523	1,524	1,524	
2000	1,673		1,670	1,669	1,676	1,676		1,667	1,673	1,683	1,683	
2010	1,887		1,883	1,881	1,894	1,892		1,871	1,891	1,917	1,920	
2020	2,120		2,118	2,113	2,133	2,127		2,093	2,124	2,174	2,175	
2030	2,314		2,318	2,309	2,336	2,327		2,277	2,311	2,385	2,376	
North Central												
1984	1,823		1,823	1,823	1,823	1,823		1,823	1,823	1,823	1,823	
1990	1,912		1,913	1,913	1,912	1,913		1,911	1,912	1,914	1,914	
2000	2,027		2,030	2,031	2,030	2,030		2,020	2,027	2,038	2,038	
2010	2,228		2,232	2,232	2,235	2,233		2,210	2,232	2,261	2,265	
2020	2,458		2,459	2,459	2,472	2,466		2,429	2,462	2,516	2,518	
2030	2,660		2,652	2,652	2,683	2,674		2,619	2,656	2,736	2,726	

Table 4.4—Simulated effects of selected futures on projected hardwood roundwood supplies, net annual growth, and inventories of growing stock on private ownerships by section or region; hardwood stumpage prices indexes, hardwood lumber and roundwood pulpwood consumption by section or region; and hardwood lumber price indexes in the United States, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Hardwood roundwood pulpwood consumption	*Million cubic feet*											
South												
1984	880		880	880	880	880		880	880	880	880	
1990	1,044		1,088	982	1,044	1,062		1,043	1,044	1,051	1,051	
2000	1,336		1,437	1,189	1,347	1,433		1,328	1,334	1,344	1,342	
2010	1,622		1,824	1,305	1,633	1,775		1,577	1,587	1,614	1,560	
2020	1,798		2,090	1,344	1,812	2,205		1,737	1,723	1,729	1,660	
2030	1,964		2,336	1,384	2,011	2,264		1,915	1,902	1,856	1,801	
North												
1984	588		588	588	588	588		588	588	588	588	
1990	737		762	699	737	737		737	737	737	737	
2000	984		1,042	888	983	983		984	984	983	983	
2010	1,272		1,383	1,084	1,272	1,272		1,273	1,272	1,271	1,271	
2020	1,572		1,744	1,295	1,571	1,571		1,573	1,572	1,569	1,569	
2030	1,873		2,116	1,484	1,871	1,872		1,874	1,873	1,869	1,869	
Hardwood lumber prices	*Index of prices 1967 = 100*											
1984	105.9		105.9	105.9	105.9	105.9		105.9	105.9	105.9	105.9	
1990	109.1		109.2	109.1	109.2	109.3		109.0	109.1	109.3	109.3	
2000	116.6		116.7	116.4	116.9	116.8		116.0	116.6	117.5	117.6	
2010	130.2		130.6	129.7	130.8	130.6		128.8	130.6	132.9	133.2	
2020	145.4		146.2	144.4	146.5	146.0		143.2	145.7	149.9	149.9	
2030	157.1		158.4	155.4	158.8	158.1		154.1	156.8	162.6	161.9	

[1] The future as described by the basic assumptions and other specified and implied assumptions underlying the projections in chapter 3.

[2] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by increasing softwood lumber and plywood yields by 25 percent instead of the 10-percent increase assumed in the 1979 Assessment and the Supplement. The increase in yields will be staged in the progression 9, 7, 5, 3, and 1 percent per decade.

[3] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by increasing the projected exports of lumber, plywood, and pulpwood (includes pulpwood and the pulpwood equivalent of pulp, paper, and board) by 20 percent in 1990, 40 percent in 2000, 60 percent in 2010, 80 percent in 2020, and 100 percent in 2030.

[4] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by increasing the projected imports of plywood, pulpwood (includes pulpwood and the pulpwood equivalent of pulp, paper, and board), and hardwood lumber and logs by 20 percent in 1990, 40 percent in 2000, 60 percent in 2010, 80 percent in 2020, and 100 percent in 2030.

[5] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by reducing the projected area in timberland in the South by 2 million acres in 1990, 5 million acres in 2000, and 11 million acres in 2030.

[6] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by reducing the net annual growth on pine plantations, natural pine, and mixed pine–hardwood stands shown in the empirical yield tables used in developing the base level projections by 25 percent.

Table 4.4—Simulated effects of selected futures on projected hardwood roundwood supplies, net annual growth, and inventories of growing stock on private ownerships by section or region; hardwood stumpage prices indexes, hardwood lumber and roundwood pulpwood consumption by section or region; and hardwood lumber price indexes in the United States, selected years 1984–2030—Continued

[7] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by reducing timber harvests on the national forests to 8.1 billion board feet in 1990 and maintaining this level through 2030.

[8] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the marginal cropland and pasture in the South that would yield higher rates of return in pine plantations would naturally revert to timberland by 2000 (70 percent natural pine, 30 percent hardwoods in the Southeast; 40 percent natural pine, 60 percent hardwoods in the South Central).

[9] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the marginal cropland and pasture in the South would be planted in pine.

[10] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the economic opportunities, except those involving intermediate stand treatment and those not involving area change and management types, for increasing timber supplies on timberland in private ownerships that yield 4 percent or more net of inflation or deflation would be utilized.

[11] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the economic opportunities, except those involving intermediate stand treatment and those not involving area change and management types, for increasing timber supplies on timberland in private ownerships that yield 4 percent or more net of inflation or deflation would be utilized, and all the marginal cropland and pasture would be planted in pine.

[12] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the economic opportunities to increase timber supplies on forest industry timberlands in the Douglas-fir region would be utilized.

Table 4.5—Simulated effects of selected futures on projected employment and wages and salaries in forest industries, investments in plants and equipment, State and local government revenues, in the South, selected years 1984–2030

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Employment in lumber and wood products industry						*Thousand employees*						
1984	232.1	232.1	232.1	232.1	232.1	232.1	232.1	232.1	232.1	232.1	232.1	232.1
1990	240.4	233.6	238.4	239.4	240.2	226.5	243.9	240.8	240.4	238.8	238.8	240.2
2000	229.9	216.0	228.3	225.6	225.6	197.7	230.9	231.1	229.8	226.4	227.1	229.2
2010	207.4	190.4	201.3	214.7	204.0	164.8	211.4	218.0	215.2	212.2	230.1	201.3
2020	198.9	176.1	191.3	210.3	195.0	130.8	204.2	214.3	214.8	217.8	231.9	199.7
2030	177.9	154.7	172.3	186.4	170.5	117.4	188.3	191.6	194.9	202.6	214.1	178.4
Employment in pulp and paper products industry												
1984	174.9	174.9	174.9	174.9	174.9	174.9	174.9	174.9	174.9	174.9	174.9	174.9
1990	170.7	170.9	175.7	163.1	170.7	170.9	170.8	170.8	170.7	170.8	170.8	170.8
2000	165.4	165.9	174.1	151.4	165.4	166.0	165.4	165.4	165.4	165.5	165.4	165.4
2010	157.9	158.5	170.2	137.2	157.9	158.5	157.9	157.6	157.7	157.8	157.6	157.9
2020	150.1	150.7	164.8	126.3	150.1	154.7	150.1	149.8	149.7	149.8	149.5	150.1
2030	144.2	144.9	161.2	117.3	144.4	145.2	144.2	144.0	144.0	143.8	143.7	144.2
Wages and salaries in lumber and wood products industry						*Million (1967) dollars*						
1984	1,020.5	1,020.5	1,020.5	1,020.5	1,020.5	1,020.5	1,020.5	1,020.5	1,020.5	1,020.5	1,020.5	1,020.5
1990	1,223.3	1,188.5	1,213.0	1,219.0	1,222.3	1,152.5	1,240.8	1,225.3	1,223.3	1,215.0	1,215.0	1,221.9
2000	1,258.0	1,187.5	1,254.9	1,240.2	1,239.9	1,086.7	1,269.3	1,270.3	1,263.1	1,244.6	1,248.3	1,259.9
2010	1,214.7	1,115.2	1,178.6	1,257.4	1,194.4	965.3	1,238.0	1,276.5	1,260.4	1,242.5	1,347.6	1,178.9
2020	1,229.1	1,087.9	1,182.1	1,299.2	1,204.9	808.4	1,261.6	1,323.9	1,327.5	1,345.6	1,432.7	1,234.1
2030	1,151.8	1,001.6	1,115.3	1,206.9	1,103.6	760.2	1,219.1	1,240.6	1,261.6	1,311.8	1,385.9	1,154.9
Wages and salaries in pulp and paper products industry												
1984	1,393.0	1,393.0	1,393.0	1,393.0	1,393.0	1,393.0	1,393.0	1,393.0	1,393.0	1,393.0	1,393.0	1,393.0
1990	1,446.2	1,447.4	1,488.2	1,381.6	1,446.2	1,447.4	1,446.5	1,446.5	1,446.2	1,446.8	1,446.8	1,446.8
2000	1,479.5	1,483.3	1,556.8	1,354.2	1,479.5	1,484.4	1,479.2	1,479.0	1,479.2	1,479.8	1,479.5	1,479.2
2010	1,476.0	1,481.5	1,591.5	1,283.1	1,476.3	1,482.3	1,476.0	1,473.9	1,474.5	1,475.5	1,473.4	1,476.8
2020	1,456.8	1,463.1	1,600.0	1,226.5	1,457.3	1,502.2	1,456.8	1,454.4	1,453.7	1,454.2	1,451.5	[illegible]
2030	1,446.7	1,454.1	1,616.8	1,177.0	1,448.3	1,456.4	1,446.3	1,445.1	1,445.1	1,443.0	1,441.2	1,446.5

Table 4.5—Simulated effects of selected futures on projected employment and wages and salaries in forest industries, investments in plants and equipment, State and local government revenues, in the South, selected years 1984–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Investments in lumber and wood products industry	*Million (1985) dollars*											
1984	163.4	163.4	163.4	163.4	163.4	163.4	163.4	163.4	163.4	163.4	163.4	163.4
1990	181.8	178.1	180.8	180.9	181.3	167.4	184.5	182.6	181.8	182.9	182.9	184.2
2000	163.2	160.0	160.8	161.0	161.1	143.0	162.0	165.4	164.1	161.6	162.3	163.2
2010	167.6	164.8	156.3	174.3	165.0	136.6	169.6	175.5	173.7	174.5	187.1	161.1
2020	185.5	176.9	174.7	195.5	182.2	131.3	187.6	195.3	197.6	202.6	210.0	186.9
2030	175.1	164.3	167.6	182.9	166.3	132.7	182.5	182.6	187.9	196.0	204.0	173.3
Investments in pulp and paper products industry												
1984	1,768.7	1,768.7	1,768.7	1,768.7	1,768.7	1,768.7	1,768.7	1,768.7	1,768.7	1,768.7	1,768.7	1,768.7
1990	2,673.3	2,676.5	2,680.2	2,663.5	2,673.4	2,675.8	2,673.4	2,673.2	2,673.3	2,674.3	2,674.3	2,673.8
2000	3,030.2	3,036.3	3,037.5	3,019.8	3,031.1	3,037.9	3,030.0	3,029.6	3,030.0	3,030.6	3,030.4	3,029.5
2010	3,017.5	3,025.1	3,030.5	2,997.0	3,018.0	3,026.0	3,017.6	3,014.4	3,014.9	3,016.6	3,012.3	3,019.2
2020	3,143.3	3,152.4	3,159.2	3,118.9	3,144.1	3,162.3	3,143.9	3,140.2	3,138.5	3,138.2	3,134.3	3,143.7
2030	3,256.2	3,266.6	3,274.5	3,227.7	3,259.2	3,268.1	3,254.5	3,254.4	3,254.1	3,250.0	3,248.3	3,255.5
Total State and local government revenue	*Million (1982) dollars*											
Southeast												
1984	45,934	45,934	45,934	45,934	45,934	45,934	45,934	45,934	45,934	45,934	45,934	45,934
1990	52,411	51,718	53,146	51,307	50,192	50,485	52,908	55,302	55,302	52,389	55,281	52,475
2000	66,575	66,921	68,198	64,000	60,836	64,303	67,462	75,274	75,339	66,554	75,274	66,445
2010	80,505	79,943	81,847	77,260	72,571	77,823	80,679	95,489	95,360	80,917	98,670	79,315
2020	94,615	93,750	98,639	91,564	84,707	91,261	96,757	112,130	112,368	99,591	116,458	96,432
2030	107,506	107,636	112,807	101,708	94,196	102,616	110,817	125,794	126,097	115,230	131,420	108,588
South Central												
1984	59,404	59,404	59,404	59,404	59,404	59,404	59,404	59,404	59,404	59,404	59,404	59,404
1990	69,516	69,355	69,784	68,776	68,625	68,658	69,881	71,616	71,573	69,473	71,530	69,538
2000	84,134	83,759	85,164	82,236	81,689	81,989	84,005	90,421	90,357	84,005	90,207	84,102
2010	98,630	98,684	99,756	96,463	95,175	94,576	99,445	109,589	109,557	99,681	110,747	98,394
2020	114,480	113,655	115,199	112,110	109,868	107,005	114,899	125,077	125,013	115,553	126,117	114,051
2030	128,121	126,758	129,483	125,171	122,491	120,602	128,850	138,482	139,405	129,257	140,316	127,563

Table 4.5—Simulated effects of selected futures on projected employment and wages and salaries in forest industries, investments in plants and equipment, State and local government revenues, in the South, selected years 1984–2030—Continued

[1] The future as described by the basic assumptions and other specified and implied assumptions underlying the projections in chapter 3.

[2] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by increasing softwood lumber and plywood yields by 25 percent instead of the 10-percent increase assumed in the 1979 Assessment and the Supplement. The increase in yields will be staged in the progression 9, 7, 5, 3, and 1 percent per decade.

[3] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by increasing the projected exports of lumber, plywood, and pulpwood (includes pulpwood and the pulpwood equivalent of pulp, paper, and board) by 20 percent in 1990, 40 percent in 2000, 60 percent in 2010, 80 percent in 2020, and 100 percent in 2030.

[4] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by increasing the projected imports of plywood, pulpwood (includes pulpwood and the pulpwood equivalent of pulp, paper, and board), and hardwood lumber and logs by 20 percent in 1990, 40 percent in 2000. 60 percent in 2010, 80 percent in 2020, and 100 percent in 2030.

[5] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by reducing the projected area in timberland in the South by 2 million acres in 1990, 5 million acres in 2000, and 11 million acres in 2030.

[6] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by reducing the net annual growth on pine plantations, natural pine, and mixed pine–hardwood stands shown in the empirical yield tables used in developing the base level projections by 25 percent.

[7] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by reducing timber harvests on the national forests to 8.1 billion board feet in 1990 and maintaining this level through 2030.

[8] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the marginal cropland and pasture in the South that would yield higher rates of return in pine plantations would naturally revert to timberland by 2000 (70 percent natural pine, 30 percent hardwoods in the Southeast; 40 percent natural pine, 60 percent hardwoods in the South Central).

[9] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the marginal cropland and pasture in the South would be planted in pine.

[10] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the economic opportunities, except those involving intermediate stand treatment and those not involving area change and management types, for increasing timber supplies on timberland in private ownerships that yield 4 percent or more net of inflation or deflation would be utilized.

[11] 11 The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the economic opportunities, except those involving intermediate stand treatment and those not involving area change and management types, for increasing timber supplies on timberland in private ownerships that yield 4 percent or more net of inflation or deflation would be utilized, and all the marginal cropland and pasture would be planted in pine.

[12] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the economic opportunities to increase timber supplies on forest industry timberlands in the Douglas-fir region would be utilized.

Table 4.6—Simulated effects of selected futures on forage, wildlife, fish, and water, by region in the South, selected years 1985–2030

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Forage—timberland							*Million tons*					
Southeast												
1985	9.4				9.4	9.1	9.4			9.4		
1990	9.5				9.4	9.6	9.5			10.3		
2000	9.9				9.6	10.5	9.9			11.7		
2010	9.7				9.3	10.7	9.6			12.0		
2020	9.2				8.9	10.8	9.2			11.1		
2030	9.0				8.5	10.9	9.0			10.4		
South Central												
1985	7.6				7.6	7.3	7.6			7.6		
1990	8.6				8.5	8.5	8.6			9.3		
2000	10.0				9.8	10.5	10.0			11.6		
2010	10.4				10.1	11.3	10.3			12.6		
2020	10.4				10.1	11.5	10.4			12.1		
2030	10.2				9.9	11.4	10.1			11.7		
Forage—pasture												
Southeast												
1985	32.8				32.5	32.8	32.8			32.8		
1990	32.8				32.6	32.8	32.8			32.8		
2000	32.5				32.4	32.5	32.5			32.5		
2010	31.9				31.9	31.9	31.9			31.9		
2020	31.5				31.7	31.5	31.5			31.5		
2030	31.1				31.4	31.1	31.1			31.1		
South Central												
1985	49.8				49.6	49.8	49.8			49.8		
1990	48.3				48.4	48.3	48.3			48.3		
2000	45.6				46.0	45.6	45.6			45.6		
2010	42.8				43.5	42.8	42.8			42.8		
2020	40.4				41.5	40.4	40.4			40.4		
2030	38.9				40.3	38.9	38.9			38.9		

Table 4.6—Simulated effects of selected futures on forage, wildlife, fish, and water, by region in the South, selected years 1985–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Forage—range	*Million tons*											
Southeast												
1985	12.2				12.1	12.2	12.2			12.2		
1990	11.4				11.4	11.4	11.4			11.4		
2000	11.1				11.0	11.1	11.1			11.1		
2010	10.9				10.9	10.9	10.9			10.9		
2020	10.7				10.7	10.7	10.7			10.7		
2030	10.5				10.5	10.5	10.5			10.5		
South Central												
1985	14.5				14.4	14.5	14.5			14.5		
1990	14.2				14.2	14.2	14.2			14.2		
2000	14.0				14.0	14.0	14.0			14.0		
2010	13.9				13.9	13.9	13.9			13.9		
2020	13.6				13.6	13.6	13.6			13.6		
2030	13.2				13.3	13.2	13.2			13.2		
White-tailed deer	*Number per square mile*											
Southeast												
1985	17.0				17.0	17.0	17.0			17.0		
1990	16.8				16.9	16.8	16.8			16.7		
2000	16.4				16.8	16.2	16.4			16.8		
2010	15.7				16.3	15.4	15.7			16.9		
2020	14.5				15.3	14.3	14.6			15.8		
2030	14.0				14.7	13.9	13.9			14.9		
South Central												
1985	17.7				17.7	17.6	17.7			17.7		
1990	17.0				17.1	17.0	17.0			16.9		
2000	16.7				16.8	16.7	16.7			16.7		
2010	16.3				16.3	16.2	16.3			16.1		
2020	15.0				14.9	14.9	15.0			15.0		
2030	14.5				14.2	14.7	14.5			14.4		

Table 4.6—Simulated effects of selected futures on forage, wildlife, fish, and water, by region in the South, selected years 1985–2030—**Continued**

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Turkey	*Number per square mile*											
Southeast												
1985	5.3				5.3	5.3	5.3			5.3		
1990	5.1				5.1	5.1	5.1			5.2		
2000	4.9				4.8	4.9	5.0			5.0		
2010	4.8				4.6	4.8	4.8			4.9		
2020	4.9				4.7	4.9	4.9			4.9		
2030	5.0				4.8	5.1	5.0			5.0		
South Central												
1985	6.6				6.6	6.6	6.6			6.6		
1990	5.9				5.9	5.9	5.9			5.8		
2000	5.7				5.7	5.7	5.7			5.7		
2010	6.2				6.1	6.2	6.2			6.3		
2020	6.2				6.1	6.2	6.2			6.4		
2030	6.5				6.4	6.6	6.5			6.9		
Red-cockaded woodpecker	*Number of counties with active colonies*											
Southeast												
1985	114				113	111	114			114		
1990	97				99	87	97			99		
2000	42				43	37	42			46		
2010	36				35	36	36			35		
2020	35				35	35	35			34		
2030	35				35	35	35			34		
South Central												
1985	56				56	56	56			56		
1990	49				49	49	49			50		
2000	53				52	52	53			49		
2010	51				50	51	51			48		
2020	49				48	48	49			46		
2030	48				45	46	49			43		
Trout	*Number per acre of stream*											
Southeast												
1985	171				170	171	171			171		
1990	173				175	173	172			170		
2000	162				172	162	163			161		
2010	131				153	130	132			138		
2020	120				143	121	121			132		
2030	119				143	121	120			130		

Table 4.6—Simulated effects of selected futures on forage, wildlife, fish, and water, by region in the South, selected years 1985–2030—Continued

(All projections at equilibrium levels)

Item and year	Base projection[1]	Improved processing efficiency[2]	High exports of timber products[3]	High imports of timber products[4]	Reduced timberland area[5]	Reduced timber growth[6]	Reduced national forest harvest[7]	Natural regeneration on marginal cropland and pasture[8]	Planted pine on marginal cropland and pasture[9]	Economic opportunities on private timberlands[10]	All economic opportunities on private lands[11]	Increased management intensity on forest industry timberlands in Douglas-fir region[12]
Water—runoff	*Inches per year*											
Southeast												
1985	16.06				16.06	16.07	16.06			16.06		
1990	16.27				16.34	16.29	16.27			16.37		
2000	16.59				16.77	16.64	16.59			16.67		
2010	16.58				16.84	16.74	16.58			16.51		
2020	16.60				16.95	16.88	16.59			16.11		
2030	16.60				17.04	16.95	16.60			16.12		
South Central												
1985	15.46				15.45	15.46	15.46			15.46		
1990	15.50				15.53	15.50	15.50			15.57		
2000	15.76				15.85	15.76	15.75			15.81		
2010	16.06				16.21	16.10	16.05			15.99		
2020	16.06				16.27	16.12	16.05			15.71		
2030	16.12				16.39	16.19	16.12			15.77		

[1] The future as described by the basic assumptions and other specified and implied assumptions underlying the projections in chapter 3.

[2] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by increasing softwood lumber and plywood yields by 25 percent instead of the 10-percent increase assumed in the 1979 Assessment and the Supplement. The increase in yields will be staged in the progression 9, 7, 5, 3, and 1 percent per decade.

[3] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by increasing the projected exports of lumber, plywood, and pulpwood (includes pulpwood and the pulpwood equivalent of pulp, paper, and board) by 20 percent in 1990, 40 percent in 2000, 60 percent in 2010, 80 percent in 2020, and 100 percent in 2030.

[4] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by increasing the projected imports of plywood, pulpwood (includes pulpwood and the pulpwood equivalent of pulp, paper, and board), and hardwood lumber and logs by 20 percent in 1990, 40 percent in 2000, 60 percent in 2010, 80 percent in 2020, and 100 percent in 2030.

[5] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by reducing the projected area in timberland in the South by 2 million acres in 1990, 5 million acres in 2000, and 11 million acres in 2030.

[6] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by reducing the net annual growth on pine plantations, natural pine, and mixed pine–hardwood stands shown in the empiricalyield tables used in developing the base level projections by 25 percent.

[7] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by reducing timber harvests on the national forests to 8.1 billion board feet in 1990 and maintaining this level through 2030.

[8] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the marginal cropland and pasture in the South that would yield higher rates of return in pine plantations would naturally revert to timberland by 2000 (70 percent natural pine, 30 percent hardwoods in the Southeast; 40 percent natural pine, 60 percent hardwoods in the South Central).

[9] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the marginal cropland and pasture in the South would be planted in pine.

[10] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the economic opportunities, except those involving intermediate stand treatment and those not involving area change and management types, for increasing timber supplies on timberland in private ownerships that yield 4 percent or more net of inflation or deflation would be utilized.

[11] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the economic opportunities, except those involving intermediate stand treatment and those not involving area change and management types, for increasing timber supplies on timberland in private ownerships that yield 4 percent or more net of inflation or deflation would be utilized, and all the marginal cropland and pasture would be planted in pine.

[12] The future as described by the basic assumptions and other specified and implied assumptions in chapter 3 modified by assuming that all the economic opportunities to increase timber supplies on forest industry timberlands in the Douglas-fir region would be utilized.

[This page intentionally left blank.]

Appendix 5

Table 5.1—Opportunities for increasing timber supplies on timberland in the South that will yield 4 percent[1] or more by ownership, forest management type, and treatment opportunity

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
All forest types															
Regenerate with site preparation[2]	30.25	4,046.7	1,438.6	4.68	609.3	228.8	22.88	3,084.5	1,091.2	1.20	162.2	55.2	1.49	190.7	63.3
Regenerate without site preparation[3]	1.50	56.1	71.3	0.53	20.6	26.9	0.87	32.4	40.4	0.04	1.6	1.7	0.06	1.5	2.2
Convert stand to preferred species[4]	2.19	206.8	101.1	0.35	31.0	16.0	1.71	166.1	80.1	0.07	5.6	2.8	0.06	4.1	2.2
Precommercial thin seedlings and saplings[5]	1.10	49.3	42.6	0.43	19.4	17.1	0.62	27.4	23.4	0.03	1.6	1.4	0.02	0.9	0.8
Commercial thin poletimber stands[6]	5.17	233.7	217.5	1.27	56.7	52.5	3.49	157.5	148.0	0.27	12.8	10.6	0.15	6.7	6.4
Stocking control, clean, or release[7]	14.07	674.8	558.5	2.61	124.3	101.8	10.46	501.0	419.4	0.59	30.2	22.8	0.41	19.3	14.4
Clearcut mature stands and regenerate[8]	12.97	1,281.0	687.2	2.46	220.9	128.3	8.25	818.2	435.5	1.79	197.9	98.8	0.47	44.0	24.6
Salvage harvest and regenerate[9]	2.77	317.6	131.5	0.48	48.5	22.1	2.02	240.6	97.4	0.08	10.5	4.5	0.19	18.1	7.6
All treatments earning:															
4 percent or more	70.03	6,865.9	3,248.3	12.81	1,130.8	593.5	50.29	5,027.6	2,335.3	4.07	422.3	197.9	2.86	285.2	121.5
less than 4 percent	11.64			2.51			7.98			0.53			0.62		
Nonstocked land															
Regenerate with site preparation[2]	3.07	176.1	127.5	0.51	29.1	21.9	2.26	129.5	93.1	0.10	5.7	4.3	0.21	11.8	8.2
Regenerate without site preparation[3]	0.51	21.2	26.1	0.27	11.1	14.0	0.20	8.5	10.4	0.03	1.2	1.4	0.01	0.3	0.4
Convert stand to preferred species[4]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Precommercial thin seedlings and saplings[5]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Commercial thin poletimber stands[6]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Stocking control, clean, or release[7]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Clearcut mature stands and regenerate[8]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Salvage harvest and regenerate[9]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
All treatments earning:															
4 percent or more	3.58	197.3	153.6	0.78	40.3	35.8	2.46	138.0	103.5	0.13	6.9	5.6	0.22	12.1	8.6
less than 4 percent	0.01			—			0.01			—			—		

Table 5.1—Opportunities for increasing timber supplies on timberland in the South that will yield 4 percent[1] or more by ownership, forest management type, and treatment opportunity—Continued

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
Pine plantations															
Regenerate with site preparation[2]	0.55	56.8	22.4	0.26	26.9	10.9	0.26	27.2	10.5	0.02	1.6	0.7	0.01	1.1	0.4
Regenerate without site preparation[3]	0.05	1.9	1.6	0.02	1.0	0.8	0.02	0.7	0.6	—	—	—	0.01	0.2	0.2
Convert stand to preferred species[4]	0.05	5.0	2.2	0.03	3.1	1.3	0.02	1.4	0.6	—	—	—	0.01	0.5	0.3
Precommercial thin seedlings and saplings[5]	0.10	4.5	3.4	0.06	2.6	2.0	0.04	1.6	1.2	—	0.2	0.1	0.01	0.2	0.2
Commercial thin poletimber stands[6]	0.48	19.5	16.2	0.22	9.2	7.6	0.25	10.1	8.4	—	—	—	—	0.2	0.2
Stocking control, clean, or release[7]	0.57	26.1	19.8	0.30	13.9	10.5	0.24	11.1	8.5	0.02	0.8	0.6	0.01	0.3	0.2
Clearcut mature stands and regenerate[8]	0.36	37.9	19.0	0.12	11.9	6.2	0.23	24.9	12.3	0.01	1.1	0.6	—	—	—
Salvage harvest and regenerate[9]	0.01	0.6	0.5	—	0.2	0.2	0.01	0.4	0.3	—	—	—	—	—	—
All treatments earning:															
4 percent or more	2.17	152.3	85.2	1.02	68.8	39.5	1.06	77.4	42.4	0.05	3.7	2.0	0.04	2.5	1.4
less than 4 percent	2.11			1.10			0.95			0.02			0.05		
Natural pine stands															
Regenerate with site preparation[2]	4.13	424.0	196.0	0.70	72.6	34.2	2.86	293.0	136.8	0.23	23.2	10.0	0.35	35.3	15.0
Regenerate without site preparation[3]	0.13	5.9	6.3	0.02	0.7	0.9	0.11	5.2	5.4	—	—	—	—	—	—
Convert stand to preferred species[4]	0.20	17.4	10.1	0.03	2.8	1.5	0.16	13.5	7.9	0.01	1.0	0.6	—	0.2	0.1
Precommercial thin seedlings and saplings[5]	0.43	19.3	16.4	0.10	4.7	3.9	0.31	13.7	11.7	0.01	0.6	0.5	0.01	0.4	0.3
Commercial thin poletimber stands[6]	3.32	150.5	143.8	0.76	34.5	33.1	2.29	103.2	99.4	0.18	8.5	7.1	0.10	4.2	4.2
Stocking control, clean, or release[7]	2.34	115.3	99.3	0.49	23.5	21.4	1.67	82.7	70.7	0.08	4.4	3.3	0.09	4.7	3.9
Clearcut mature stands and regenerate[8]	4.59	478.7	297.8	1.04	111.0	68.6	2.59	268.6	170.0	0.78	81.7	48.3	0.18	17.4	10.9
Salvage harvest and regenerate[9]	0.45	50.7	25.8	0.10	10.7	5.8	0.30	34.8	17.2	0.02	2.1	1.2	0.03	3.2	1.7
All treatments earning:															
4 percent or more	15.59	1,261.8	795.5	3.24	260.4	169.2	10.28	814.6	519.1	1.32	121.5	71.1	0.76	65.3	36.1
less than 4 percent	0.08			0.01			0.06			0.01			—		

Table 5.1—Opportunities for increasing timber supplies on timberland in the South that will yield 4 percent[1] or more by ownership, forest management type, and treatment opportunity—Continued

	All ownerships			Forest industry			Other private			National forest			Other public		
Forest type and treatment opportunity	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
Pine–hardwood stands															
Regenerate with site preparation[2]	4.66	693.9	242.8	0.76	114.0	41.2	3.45	510.8	180.0	0.2	31.7	10.6	0.25	37.3	11.0
Regenerate without site preparation[3]	0.09	4.4	4.9	0.03	1.3	1.6	0.06	3.0	3.2	—	—	—	—	0.1	0.1
Convert stand to preferred species[4]	0.31	26.6	16.1	0.05	4.8	3.0	0.23	19.4	11.8	0.01	1.5	0.7	0.01	1.0	0.6
Precommercial thin seedlings and saplings[5]	0.21	9.4	8.3	0.12	5.5	4.8	0.08	3.8	3.3	—	—	—	—	0.2	0.2
Commercial thin poletimber stands[6]	0.61	28.6	26.3	0.19	8.6	8.2	0.36	16.9	15.7	0.05	2.6	2.1	0.01	0.4	0.4
Stocking control, clean, or release[7]	3.04	146.7	129.7	0.62	29.5	26.6	2.18	105.3	93.7	0.17	8.9	6.9	0.07	3.1	2.5
Clearcut mature stands and regenerate[8]	1.33	135.5	83.5	0.26	27.0	16.8	0.83	84.7	52.5	0.17	17.2	10.2	0.07	6.5	4.0
Salvage harvest and regenerate[9]	0.28	32.7	15.7	0.06	7.4	3.8	0.20	23.7	11.1	0.01	1.6	0.8	—	—	—
All treatments earning:															
4 percent or more	10.53	1,077.8	527.3	2.09	198.1	106.0	7.40	767.6	371.3	0.63	63.6	31.3	0.41	48.6	18.7
less than 4 percent	0.37			0.04			0.26			0.05			0.02		
Upland hardwood stands															
Regenerate with site preparation[2]	13.68	2,072.9	729.9	1.66	248.7	98.0	10.99	1,664.2	581.9	0.61	93.1	28.5	0.43	66.8	21.5
Regenerate without site preparation[3]	0.43	21.5	26.1	0.13	6.4	8.2	0.28	14.1	16.9	0.01	0.4	0.3	0.01	0.7	0.7
Convert stand to preferred species[4]	1.08	132.1	57.4	0.13	15.3	7.1	0.90	112.8	48.4	0.03	2.9	1.4	0.01	1.1	0.5
Precommercial thin seedlings and saplings[5]	0.34	15.5	14.2	0.15	6.7	6.4	0.18	7.8	6.9	0.02	0.8	0.8	—	0.2	0.1
Commercial thin poletimber stands[6]	0.66	31.0	29.4	0.06	3.2	3.1	0.52	24.5	23.4	0.03	1.7	1.4	0.03	1.6	1.6
Stocking control, clean, or release[7]	6.41	306.5	279.0	0.83	39.5	36.8	5.13	244.6	224.3	0.29	14.8	11.6	0.16	7.5	6.4
Clearcut mature stands and regenerate[8]	3.77	493.6	211.4	0.26	34.6	16.5	2.65	350.3	150.4	0.75	93.9	37.9	0.11	14.9	6.7
Salvage harvest and regenerate[9]	1.07	183.9	65.3	0.12	19.8	7.3	0.86	148.5	52.5	0.04	6.3	2.2	0.05	9.4	3.2
All treatments earning:															
4 percent or more	27.44	3,257.0	1,412.8	3.33	374.2	183.4	21.51	2,566.8	1,104.7	1.78	213.9	84.0	0.82	102.1	40.7
less than 4 percent	2.84			0.19			2.14			0.39			0.12		

Table 5.1—Opportunities for increasing timber supplies on timberland in the South that will yield 4 percent[1] or more by ownership, forest management type, and treatment opportunity—Continued

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
Bottomland hardwood stands															
Regenerate with site preparation[2]	4.15	622.9	120.0	0.79	117.9	22.7	3.06	459.7	88.8	0.05	6.9	1.2	0.25	38.4	7.2
Regenerate without site preparation[3]	0.30	1.3	6.3	0.07	0.2	1.5	0.19	0.9	4.0	—	—	—	0.04	0.2	0.8
Convert stand to preferred species[4]	0.55	25.7	15.3	0.11	5.1	3.0	0.41	19.0	11.4	0.01	0.2	0.1	0.03	1.3	0.7
Precommercial thin seedlings and saplings[5]	0.01	0.5	0.2	—	—	—	0.01	0.5	0.2	—	—	—	—	—	—
Commercial thin poletimber stands[6]	0.11	4.1	1.7	0.03	1.1	0.5	0.07	2.7	1.2	—	—	—	—	0.2	0.1
Stocking control, clean, or release[7]	1.72	80.1	30.7	0.37	17.9	6.5	1.24	57.2	22.3	0.03	1.3	0.5	0.08	3.8	1.4
Clearcut mature stands and regenerate[8]	2.91	135.3	75.5	0.78	36.4	20.3	1.94	89.8	50.2	0.08	3.9	1.9	0.11	5.1	3.0
Salvage harvest and regenerate[9]	0.97	49.8	24.3	0.20	10.4	5.0	0.65	33.3	16.3	0.01	0.5	0.3	0.11	5.6	2.7
All treatments earning:															
4 percent or more	10.72	919.6	274.0	2.35	189.0	59.6	7.57	663.2	194.4	0.17	12.8	4.0	0.62	54.6	16.0
less than 4 percent	6.24			1.17			4.57			0.07			0.43		

[1] Yields measured in constant dollars, net of inflation or deflation. Economic returns do not include land costs, ad valorem taxes, or income taxes.

[2] Nonstocked or cutover sites with competing vegetation and requiring site preparation prior to regeneration.

[3] Nonstocked or cutover sites without significant competing vegetation not requiring site preparation for regeneration.

[4] Sites stocked with low-quality trees or off-site species requiring conversion to preferred species to improve productivity.

[5] Sites densely stocked with seedlings and/or saplings requiring precommercial thinning or similar treatments to reduce stocking and favor potential crop trees.

[6] Sites densely stocked with immature but merchantable trees.

[7] Sites adequately stocked with trees, but with inhibiting vegetation.

[8] Sites with mature or overmature sawtimber size trees.

[9] Sites with merchantable trees excessively damaged by fire, insects, disease, wind, ice, or other destructive agents.

Table 5.2—Opportunities for increasing timber supplies on timberland in the Southeast that will yield 4 percent[1] or more by ownership, forest management type, and treatment opportunity

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treat- ment	Net annual growth incre- ment	Area	Cost of treat- ment	Net annual growth incre- ment	Area	Cost of treat- ment	Net annual growth incre- ment	Area	Cost of treat- ment	Net annual growth incre- ment	Area	Cost of treat- ment	Net annual growth incre- ment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
All forest types															
Regenerate with site preparation[2]	14.66	1,709.3	649.7	2.14	244.8	87.9	11.01	1,294.3	497.7	0.60	68.4	26.5	0.91	101.7	37.6
Regenerate without site preparation[3]	0.64	26.1	32.2	0.29	11.8	14.9	0.30	12.5	15.3	0.03	1.2	1.4	0.02	0.7	0.7
Convert stand to preferred species[4]	1.33	125.4	60.7	0.19	17.7	8.8	1.07	103.5	49.7	0.02	1.5	0.8	0.04	2.8	1.4
Precommercial thin seedlings and saplings[5]	0.73	31.9	27.1	0.15	6.7	5.7	0.53	23.2	19.7	0.02	1.0	0.9	0.02	0.9	0.8
Commercial thin poletimber stands[6]	2.40	105.7	99.2	0.44	19.2	17.4	1.79	79.0	74.7	0.06	2.9	2.7	0.11	4.6	4.4
Stocking control, clean, or release[7]	5.73	279.9	216.6	0.83	40.5	27.6	4.48	218.4	173.8	0.20	10.6	7.5	0.21	10.5	7.7
Clearcut mature stands and regenerate[8]	7.54	717.4	357.0	0.99	70.0	38.6	5.21	505.6	252.3	1.02	110.9	49.5	0.33	31.0	16.6
Salvage harvest and regenerate[9]	0.47	48.3	23.9	0.08	7.1	3.8	0.34	35.8	17.5	0.02	2.5	1.1	0.03	2.8	1.6
All treatments earning:															
4 percent or more	33.49	3,044.0	1,466.5	5.12	417.7	204.7	24.72	2,272.4	1,100.8	1.98	199.0	90.3	1.67	154.9	70.7
less than 4 percent	3.47			1.04			2.03			0.26			0.13		
Nonstocked land															
Regenerate with site preparation[2]	3.05	174.4	126.2	0.50	28.8	21.6	2.24	128.1	92.2	0.10	5.7	4.3	0.21	11.8	8.2
Regenerate without site preparation[3]	0.44	17.8	22.5	0.23	9.2	11.7	0.18	7.1	9.0	0.03	1.2	1.4	0.01	0.3	0.4
Convert stand to preferred species[4]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Precommercial thin seedlings and saplings[5]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Commercial thin poletimber stands[6]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Stocking control, clean, or release[7]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Clearcut mature stands and regenerate[8]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Salvage harvest and regenerate[9]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
All treatments earning:															
4 percent or more	3.49	192.3	148.7	0.73	38.0	33.3	2.41	135.2	101.2	0.13	6.9	5.6	0.22	12.1	8.6
less than 4 percent	—			—			—			—			—		

Table 5.2—Opportunities for increasing timber supplies on timberland in the Southeast that will yield 4 percent[1] or more by ownership, forest management type, and treatment opportunity—Continued

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
Pine plantations															
Regenerate with site preparation[2]	0.21	20.7	7.6	0.08	8.2	2.9	0.12	11.9	4.5	—	—	—	0.01	0.5	0.2
Regenerate without site preparation[3]	0.03	1.3	1.2	0.01	0.4	0.4	0.02	0.7	0.6	—	—	—	0.01	0.2	0.2
Convert stand to preferred species[4]	0.03	2.5	1.1	0.01	0.5	0.2	0.02	1.4	0.6	—	—	—	0.01	0.5	0.3
Precommercial thin seedlings and saplings[5]	0.06	2.4	1.8	0.03	1.2	0.9	0.02	0.8	0.6	—	0.2	0.1	0.01	0.2	0.2
Commercial thin poletimber stands[6]	0.30	12.6	10.1	0.12	5.3	4.2	0.17	7.0	5.7	—	—	—	—	0.2	0.2
Stocking control, clean, or release[7]	0.18	8.0	6.2	0.10	4.3	3.3	0.07	3.2	2.5	—	0.2	0.2	0.01	0.3	0.2
Clearcut mature stands and regenerate[8]	0.01	1.0	0.5	—	0.2	0.1	0.01	0.8	0.4	—	—	—	—	—	—
Salvage harvest and regenerate[9]	0.01	0.6	0.5	—	0.2	0.2	0.01	0.4	0.3	—	—	—	—	—	—
All treatments earning:															
4 percent or more	0.82	49.0	28.9	0.36	20.4	12.4	0.43	26.2	15.1	0.01	0.4	0.3	0.03	2.0	1.2
less than 4 percent	1.36			0.72			0.60			0.01			0.04		
Natural pine stands															
Regenerate with site preparation[2]	2.78	281.4	124.2	0.39	39.4	16.4	1.95	196.5	88.7	0.16	15.9	6.6	0.29	29.6	12.5
Regenerate without site preparation[3]	0.05	2.3	2.5	—	0.2	0.2	0.05	2.1	2.4	—	—	—	—	—	—
Convert stand to preferred species[4]	0.13	9.7	5.7	0.02	1.5	0.9	0.10	7.9	4.7	—	0.1	0.1	—	0.2	0.1
Precommercial thin seedlings and saplings[5]	0.38	17.1	14.6	0.07	3.1	2.5	0.30	13.3	11.5	0.01	0.3	0.3	0.01	0.4	0.3
Commercial thin poletimber stands[6]	1.87	82.9	80.4	0.28	12.3	11.9	1.44	64.2	62.1	0.06	2.6	2.5	0.09	3.9	3.9
Stocking control, clean, or release[7]	1.39	69.6	57.9	0.15	7.5	6.1	1.10	55.2	46.5	0.04	2.5	1.7	0.09	4.4	3.6
Clearcut mature stands and regenerate[8]	1.33	125.6	78.3	0.12	10.8	6.9	0.93	89.7	56.3	0.18	16.2	9.6	0.10	8.8	5.4
Salvage harvest and regenerate[9]	0.21	21.0	11.5	0.05	4.6	2.5	0.13	13.1	7.1	0.01	0.8	0.5	0.03	2.5	1.4
All treatments earning:															
4 percent or more	8.13	609.6	375.1	1.08	79.4	47.4	5.99	442.0	279.3	0.46	38.4	21.2	0.60	49.8	27.3
less than 4 percent	0.04			—			0.03			—			—		

Table 5.2—Opportunities for increasing timber supplies on timberland in the Southeast that will yield 4 percent[1] or more by ownership, forest management type, and treatment opportunity—Continued

Forest type and treatment opportunity	All ownerships: Area	All ownerships: Cost of treatment	All ownerships: Net annual growth increment	Forest industry: Area	Forest industry: Cost of treatment	Forest industry: Net annual growth increment	Other private: Area	Other private: Cost of treatment	Other private: Net annual growth increment	National forest: Area	National forest: Cost of treatment	National forest: Net annual growth increment	Other public: Area	Other public: Cost of treatment	Other public: Net annual growth increment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
Pine–hardwood stands															
Regenerate with site preparation[2]	2.05	300.0	96.6	0.24	35.6	11.3	1.56	227.6	74.8	0.08	11.9	3.6	0.17	25.0	6.8
Regenerate without site preparation[3]	0.02	1.0	1.4	0.01	0.6	0.9	0.01	0.3	0.4	—	—	—	—	0.1	0.1
Convert stand to preferred species[4]	0.21	16.8	10.2	0.02	1.9	1.2	0.18	13.7	8.4	0.01	0.8	0.4	—	0.3	0.2
Precommercial thin seedlings and saplings[5]	0.08	3.5	3.0	0.02	0.7	0.6	0.06	2.6	2.3	—	—	—	—	0.2	0.2
Commercial thin poletimber stands[6]	0.07	2.8	2.8	0.02	0.9	0.9	0.04	1.8	1.8	—	—	—	—	0.1	0.1
Stocking control, clean, or release[7]	1.16	57.0	47.8	0.15	7.5	6.1	0.92	45.2	38.6	0.05	2.7	1.9	0.03	1.6	1.2
Clearcut mature stands and regenerate[8]	0.71	67.7	41.2	0.09	8.0	5.2	0.47	44.7	27.3	0.09	9.3	5.2	0.06	5.7	3.5
Salvage harvest and regenerate[9]	0.05	5.7	3.0	—	0.3	0.2	0.05	5.1	2.6	—	0.4	0.2	—	—	—
All treatments earning:															
4 percent or more	4.35	454.5	206.0	0.56	55.4	26.2	3.29	341.1	156.3	0.24	25.0	11.3	0.27	33.0	12.2
less than 4 percent	0.13			0.01			0.09			0.03			—		
Upland hardwood stands															
Regenerate with site preparation[2]	4.53	638.1	238.2	0.42	59.6	22.1	3.70	522.2	196.7	0.24	31.9	11.5	0.17	24.3	7.8
Regenerate without site preparation[3]	0.08	3.5	4.6	0.03	1.2	1.6	0.05	2.3	3.0	—	—	—	—	—	—
Convert stand to preferred species[4]	0.70	84.7	37.0	0.10	11.6	5.3	0.59	71.7	31.0	0.01	0.4	0.2	0.01	1.1	0.5
Precommercial thin seedlings and saplings[5]	0.19	8.4	7.4	0.04	1.7	1.7	0.14	6.0	5.2	0.01	0.5	0.5	—	0.2	0.1
Commercial thin poletimber stands[6]	0.11	4.9	4.9	—	0.1	0.1	0.10	4.3	4.4	0.01	0.2	—	0.2	0.2	0.2
Stocking control, clean, or release[7]	2.05	100.0	87.8	0.18	8.9	7.7	1.74	84.6	74.8	0.08	4.3	3.4	0.05	2.2	1.9
Clearcut mature stands and regenerate[8]	3.35	427.3	182.7	0.20	24.9	11.8	2.38	306.8	132.0	0.67	82.3	33.1	0.10	13.3	5.8
Salvage harvest and regenerate[9]	0.12	17.5	7.3	0.01	1.1	0.4	0.10	14.8	6.3	0.01	1.3	0.5	—	0.3	0.1
All treatments earning:															
4 percent or more	11.13	1,284.3	569.9	0.98	109.2	50.7	8.79	1,012.7	453.2	1.03	121.0	49.4	0.34	41.5	16.5
less than 4 percent	0.63			0.04			0.36			0.21			0.02		

Table 5.2—Opportunities for increasing timber supplies on timberland in the Southeast that will yield 4 percent[1] or more by ownership, forest management type, and treatment opportunity—Continued

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
Bottomland hardwood stands															
Regenerate with site preparation[2]	2.03	294.6	56.9	0.49	73.1	13.7	1.44	208.1	40.8	0.02	3.0	0.5	0.07	10.4	2.0
Regenerate without site preparation[3]	—	0.2	0.1	—	0.2	0.1	—	—	—	—	—	—	—	—	—
Convert stand to preferred species[4]	0.26	11.8	6.7	0.05	2.2	1.3	0.19	8.7	5.0	0.01	0.2	0.1	0.01	0.7	0.3
Precommercial thin seedlings and saplings[5]	0.01	0.5	0.2	—	—	—	0.01	0.5	0.2	—	—	—	—	—	—
Commercial thin poletimber stands[6]	0.07	2.5	1.1	0.02	0.6	0.3	0.04	1.7	0.7	—	—	—	—	0.2	0.1
Stocking control, clean, or release[7]	0.96	45.4	16.9	0.25	12.3	4.3	0.65	30.1	11.5	0.02	0.9	0.3	0.04	2.0	0.7
Clearcut mature stands and regenerate[8]	2.15	95.9	54.2	0.58	26.0	14.7	1.43	63.5	36.2	0.07	3.2	1.5	0.07	3.2	1.8
Salvage harvest and regenerate[9]	0.08	3.4	1.7	0.02	0.8	0.5	0.05	2.5	1.2	—	—	—	—	0.1	—
All treatments earning:															
4 percent or more	5.55	454.3	137.9	1.42	115.2	34.8	3.82	315.1	95.6	0.11	7.4	2.5	0.21	16.6	5.0
less than 4 percent	1.31			0.27			0.96			0.01			0.07		

[1] Yields measured in constant dollars, net of inflation or deflation. Economic returns do not include land costs, ad valorem taxes, or income taxes.

[2] Nonstocked or cutover sites with competing vegetation and requiring site preparation prior to regeneration.

[3] Nonstocked or cutover sites without significant competing vegetation not requiring site preparation for regeneration.

[4] Sites stocked with low-quality trees or off-site species requiring conversion to preferred species to improve productivity.

[5] Sites densely stocked with seedlings and/or saplings requiring precommercial thinning or similar treatments to reduce stocking and favor potential crop trees.

[6] Sites densely stocked with immature but merchantable trees.

[7] Sites adequately stocked with trees, but with inhibiting vegetation.

[8] Sites with mature or overmature sawtimber size trees.

[9] Sites with merchantable trees excessively damaged by fire, insects, disease, wind, ice, or other destructive agents.

Table 5.3—Opportunities for increasing timber supplies on timberland in the South Central region that will yield 4 percent[1] or more by ownership, forest management type, and treatment opportunity

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
All forest types															
Regenerate with site preparation[2]	15.60	2,337.4	788.8	2.55	364.5	140.9	11.87	1,790.1	593.5	0.60	93.8	28.7	0.57	88.9	25.8
Regenerate without site preparation[3]	0.86	30.0	39.0	0.24	8.9	12.1	0.57	20.0	25.1	0.01	0.4	0.3	0.05	0.8	1.5
Convert stand to preferred species[4]	0.86	81.4	40.4	0.15	13.3	7.2	0.64	62.6	30.5	0.04	4.2	2.0	0.02	1.3	0.8
Precommercial thin seedlings and saplings[5]	0.37	17.4	15.5	0.28	12.7	11.3	0.09	4.1	3.6	0.01	0.6	0.5	—	—	—
Commercial thin poletimber stands[6]	2.77	127.9	118.3	0.82	37.5	35.1	1.70	78.4	73.2	0.20	9.9	7.9	0.04	2.0	2.0
Stocking control, clean, or release[7]	8.34	394.9	341.9	1.78	83.8	74.2	5.98	282.6	245.6	0.39	19.6	15.3	0.20	8.9	6.8
Clearcut mature stands and regenerate[8]	5.42	563.6	330.2	1.47	151.0	89.7	3.04	312.6	183.2	0.77	87.0	49.3	0.14	13.0	8.0
Salvage harvest and regenerate[9]	2.30	269.4	107.6	0.40	41.4	18.4	1.68	204.8	79.8	0.06	7.9	3.4	0.16	15.3	6.0
All treatments earning:															
4 percent or more	36.54	3,821.9	1,781.8	7.69	713.1	388.8	25.57	2,755.2	1,234.6	2.09	223.3	107.6	1.18	130.3	50.8
less than 4 percent	8.18			1.47			5.96			0.27			0.48		
Nonstocked land															
Regenerate with site preparation[2]	0.03	1.7	1.2	0.01	0.4	0.3	0.02	1.4	0.9	—	—	—	—	—	—
Regenerate without site preparation[3]	0.07	3.3	3.6	0.04	1.9	2.3	0.03	1.4	1.4	—	—	—	—	—	—
Convert stand to preferred species[4]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Precommercial thin seedlings and saplings[5]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Commercial thin poletimber stands[6]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Stocking control, clean, or release[7]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Clearcut mature stands and regenerate[8]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Salvage harvest and regenerate[9]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
All treatments earning:															
4 percent or more	0.09	5.0	4.9	0.04	2.2	2.6	0.05	2.8	2.3	—	—	—	—	—	—
less than 4 percent	0.01			—			0.01			—			—		

Table 5.3—Opportunities for increasing timber supplies on timberland in the South Central region that will yield 4 percent[1] or more by ownership, forest management type, and treatment opportunity—Continued

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
Pine plantations															
Regenerate with site preparation[2]	0.35	36.1	14.8	0.18	18.7	7.9	0.15	15.3	6.0	0.02	1.6	0.6	0.01	0.5	0.2
Regenerate without site preparation[3]	0.01	0.6	0.4	0.01	0.6	0.4	—	—	—	—	—	—	—	—	—
Convert stand to preferred species[4]	0.02	2.6	1.1	0.02	2.6	1.1	—	—	—	—	—	—	—	—	—
Precommercial thin seedlings and saplings[5]	0.05	2.1	1.6	0.03	1.3	1.0	0.02	0.8	0.6	—	—	—	—	—	—
Commercial thin poletimber stands[6]	0.18	7.0	6.1	0.10	3.9	3.4	0.08	3.1	2.7	—	—	—	—	—	—
Stocking control, clean, or release[7]	0.38	18.1	13.6	0.20	9.6	7.2	0.17	7.9	6.0	0.01	0.6	0.4	—	—	—
Clearcut mature stands and regenerate[8]	0.35	36.9	18.6	0.11	11.7	6.1	0.23	24.0	11.9	0.01	1.1	0.6	—	—	—
Salvage harvest and regenerate[9]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
All treatments earning:															
4 percent or more	1.35	103.4	56.3	0.66	48.4	27.1	0.64	51.2	27.3	0.04	3.3	1.7	0.01	0.5	0.2
less than 4 percent	0.75			0.38			0.35			0.01			0.01		
Natural pine stands															
Regenerate with site preparation[2]	1.35	142.6	71.8	0.31	33.1	17.8	0.91	96.5	48.1	0.07	7.3	3.4	0.05	5.7	2.5
Regenerate without site preparation[3]	—	3.7	3.8	0.01	0.5	0.7	0.06	3.1	3.1	—	—	—	—	—	—
Convert stand to preferred species[4]	0.08	7.7	4.4	0.01	1.3	0.6	0.06	5.5	3.2	0.01	0.9	0.5	—	—	—
Precommercial thin seedlings and saplings[5]	—	2.2	1.8	0.03	1.6	1.4	0.01	0.3	0.2	0.01	0.3	0.2	—	—	—
Commercial thin poletimber stands[6]	1.46	67.5	63.4	0.48	22.2	21.2	0.85	39.0	37.2	0.12	5.9	4.7	0.01	0.4	0.3
Stocking control, clean, or release[7]	0.95	45.8	41.3	0.34	16.0	15.2	0.57	27.6	24.2	0.04	1.9	1.6	0.01	0.3	0.3
Clearcut mature stands and regenerate[8]	3.26	353.1	219.5	0.92	100.1	61.7	1.67	178.8	113.7	0.60	65.6	38.6	0.08	8.5	5.5
Salvage harvest and regenerate[9]	0.24	29.6	14.3	0.05	6.0	3.3	0.17	21.7	10.1	0.01	1.2	0.7	—	0.7	0.3
All treatments earning:															
4 percent or more	7.46	652.2	420.3	2.16	181.0	121.9	4.29	372.6	239.8	0.86	83.1	49.9	0.15	15.5	8.8
less than 4 percent	0.04			0.04			0.04			—			—		

Table 5.3—Opportunities for increasing timber supplies on timberland in the South Central region that will yield 4 percent[1] or more by ownership, forest management type, and treatment opportunity—Continued

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
Pine–hardwood stands															
Regenerate with site preparation[2]	2.61	393.9	146.2	0.52	78.5	30.0	1.88	283.2	105.1	0.13	19.8	7.0	0.08	12.3	4.2
Regenerate without site preparation[3]	0.07	3.4	3.5	0.01	0.6	0.7	0.06	2.7	2.8	—	—	—	—	—	—
Convert stand to preferred species[4]	0.10	9.9	5.8	0.03	2.8	1.8	0.06	5.7	3.4	0.01	0.7	0.3	0.01	0.6	0.4
Precommercial thin seedlings and saplings[5]	0.13	5.9	5.3	0.11	4.8	4.3	0.02	1.1	1.1	—	—	—	—	—	—
Commercial thin poletimber stands[6]	0.55	25.7	23.5	0.17	7.7	7.3	0.32	15.1	13.8	0.05	2.6	2.1	0.01	0.3	0.3
Stocking control, clean, or release[7]	1.88	89.7	81.9	0.46	22.0	20.5	1.26	60.0	55.1	0.12	6.2	5.0	0.03	1.5	1.3
Clearcut mature stands and regenerate[8]	0.62	67.8	42.3	0.17	19.0	11.6	0.37	40.0	25.2	0.07	8.0	5.0	0.01	0.8	0.5
Salvage harvest and regenerate[9]	0.22	27.0	12.7	0.06	7.2	3.6	0.15	18.6	8.5	0.01	1.3	0.7	—	—	—
All treatments earning:															
4 percent or more	6.17	623.3	321.3	1.53	142.7	79.8	4.12	426.4	214.9	0.39	38.6	20.0	0.13	15.6	6.6
less than 4 percent	0.24			0.04			0.17			0.02			0.01		
Upland hardwood stands															
Regenerate with site preparation[2]	9.15	1,434.8	491.7	1.23	189.1	75.9	7.29	1,142.0	385.3	0.36	61.2	16.9	0.26	42.5	13.7
Regenerate without site preparation[3]	0.35	18.0	21.5	0.10	5.3	6.6	0.23	11.7	13.9	0.01	0.4	0.3	0.01	0.7	0.7
Convert stand to preferred species[4]	0.37	47.3	20.4	0.03	3.7	1.9	0.31	41.1	17.4	0.03	2.5	1.1	—	—	—
Precommercial thin seedlings and saplings[5]	0.15	7.2	6.7	0.11	5.0	4.7	0.04	1.9	1.7	0.01	0.3	0.3	—	—	—
Commercial thin poletimber stands[6]	0.55	26.1	24.6	0.06	3.1	3.0	0.43	20.2	19.0	0.03	1.4	1.2	0.03	1.4	1.4
Stocking control, clean, or release[7]	4.37	206.5	191.2	0.65	30.6	29.1	3.39	160.1	149.5	0.21	10.5	8.1	0.12	5.3	4.4
Clearcut mature stands and regenerate[8]	0.42	66.4	28.7	0.06	9.7	4.7	0.27	43.5	18.4	0.07	11.6	4.8	0.01	1.6	0.8
Salvage harvest and regenerate[9]	0.95	166.4	58.0	0.11	18.6	6.9	0.76	133.7	46.3	0.03	4.9	1.7	0.05	9.1	[illegible]
All treatments earning:															
4 percent or more	16.31	1,972.7	842.8	2.35	265.1	132.6	12.73	1,554.1	651.5	0.74	92.9	34.6	0.48	60.6	24.2
less than 4 percent	2.21			0.15			1.78			0.18			0.10		

Table 5.3—Opportunities for increasing timber supplies on timberland in the South Central region that will yield 4 percent[1] or more by ownership, forest management type, and treatment opportunity—Continued

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
Bottomland hardwood stands															
Regenerate with site preparation[2]	2.12	328.3	63.0	0.30	44.8	9.0	1.62	251.7	48.0	0.03	3.9	0.7	0.17	28.0	5.3
Regenerate without site preparation[3]	0.29	1.1	6.2	0.07	—	1.4	0.19	0.9	4.0	—	—	—	0.04	0.2	0.8
Convert stand to preferred species[4]	0.29	13.9	8.6	0.06	2.9	1.7	0.22	10.3	6.5	—	—	—	0.01	0.7	0.4
Precommercial thin seedlings and saplings[5]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Commercial thin poletimber stands[6]	0.04	1.6	0.7	0.01	0.6	0.2	0.03	1.0	0.4	—	—	—	—	—	—
Stocking control, clean, or release[7]	0.76	34.7	13.9	0.12	5.5	2.2	0.59	27.1	10.8	0.01	0.4	0.1	0.04	1.8	0.7
Clearcut mature stands and regenerate[8]	0.77	39.3	21.2	0.20	10.4	5.7	0.51	26.3	14.0	0.01	0.6	0.4	0.04	2.0	1.2
Salvage harvest and regenerate[9]	0.89	46.4	22.5	0.18	9.5	4.6	0.59	30.8	15.0	0.01	0.5	0.3	0.11	5.5	2.7
All treatments earning:															
4 percent or more	5.16	465.3	136.1	0.94	73.8	24.8	3.75	348.1	98.7	0.06	5.4	1.5	0.41	38.0	11.0
less than 4 percent	4.93			0.90			3.61			0.06			0.36		

[1] Yields measured in constant dollars, net of inflation or deflation. Economic returns do not include land costs, ad valorem taxes, or income taxes.

[2] Nonstocked or cutover sites with competing vegetation and requiring site preparation prior to regeneration.

[3] Nonstocked or cutover sites without significant competing vegetation not requiring site preparation for regeneration.

[4] Sites stocked with low-quality trees or off-site species requiring conversion to preferred species to improve productivity.

[5] Sites densely stocked with seedlings and/or saplings requiring precommercial thinning or similar treatments to reduce stocking and favor potential crop trees.

[6] Sites densely stocked with immature but merchantable trees.

[7] Sites adequately stocked with trees, but with inhibiting vegetation.

[8] Sites with mature or overmature sawtimber size trees.

[9] Sites with merchantable trees excessively damaged by fire, insects, disease, wind, ice, or other destructive agents.

Table 5.4—Opportunities for increasing timber supplies in the South that will yield 10 percent[1] or more by ownership, forest management type, and treatment opportunity

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
All forest types															
Regenerate with site preparation[2]	7.77	794.6	475.9	1.73	180.7	105.7	5.59	572.7	343.7	0.22	20.4	13.0	0.23	20.8	13.6
Regenerate without site preparation[3]	1.33	48.3	65.2	0.50	19.3	25.9	0.75	27.1	36.4	0.02	0.9	1.1	0.05	1.0	1.8
Convert stand to preferred species[4]	1.37	112.4	65.6	0.26	21.2	12.2	1.04	85.4	50.2	0.03	2.8	1.6	0.04	3.0	1.7
Precommercial thin seedlings and saplings[5]	0.27	11.4	10.4	0.10	4.4	3.8	0.15	6.1	5.7	0.01	0.6	0.5	0.01	0.4	0.3
Commercial thin poletimber stands[6]	4.35	193.5	184.1	1.14	50.3	47.4	2.90	128.9	123.7	0.20	9.3	8.1	0.11	4.9	4.9
Stocking control, clean, or release[7]	6.38	301.4	247.6	1.53	72.0	58.8	4.43	209.1	173.5	0.22	10.8	8.5	0.20	9.6	6.9
Clearcut mature stands and replant[8]	12.94	1,278.1	686.0	2.45	220.8	128.3	8.23	815.6	434.5	1.78	197.7	98.7	0.47	44.0	24.6
Salvage harvest and regenerate[9]	1.98	173.9	87.4	0.41	36.2	18.3	1.36	121.6	60.8	0.06	5.9	3.1	0.15	10.1	5.1
All treatments earning:															
10 percent or more	36.39	2,913.5	1,822.2	8.12	604.9	400.3	24.46	1,966.5	1,228.3	2.54	248.3	134.5	1.28	93.8	59.0
less than 10 percent	45.28			7.20			33.82			2.06			2.20		
Nonstocked land															
Regenerate with site preparation[2]	1.28	70.6	64.3	0.27	14.9	13.3	0.91	49.8	45.6	0.05	2.6	2.5	0.06	3.2	2.9
Regenerate without site preparation[3]	0.43	18.0	23.5	0.24	10.0	13.1	0.17	7.0	9.2	0.02	0.8	1.0	—	0.1	0.2
Convert stand to preferred species[4]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Precommercial thin seedlings and saplings[5]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Commercial thin poletimber stands[6]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Stocking control, clean, or release[7]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Clearcut mature stands and replant[8]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Salvage harvest and regenerate[9]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
All treatments earning:															
10 percent or more	1.71	88.6	87.8	0.51	25.0	26.4	1.08	56.8	54.8	0.07	3.4	3.5	0.06	3.3	3.[illegible]
less than 10 percent	1.88			0.27			1.39			0.06			0.16		

Table 5.4—Opportunities for increasing timber supplies in the South that will yield 10 percent[1] or more by ownership, forest management type, and treatment opportunity—Continued

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
Pine plantations															
Regenerate with site preparation[2]	0.28	22.5	12.2	0.14	11.8	6.3	0.12	9.7	5.3	0.01	0.8	0.4	—	0.2	0.1
Regenerate without site preparation[3]	0.04	1.5	1.3	0.02	0.9	0.8	0.01	0.5	0.5	—	—	—	—	0.1	0.1
Convert stand to preferred species[4]	0.04	4.0	1.9	0.03	2.7	1.2	0.01	0.8	0.4	—	—	—	0.01	0.5	0.3
Precommercial thin seedlings and saplings[5]	0.10	4.5	3.4	0.06	2.6	2.0	0.04	1.6	1.2	—	0.2	0.1	0.01	0.2	0.2
Commercial thin poletimber stands[6]	0.48	19.5	16.2	0.22	9.2	7.6	0.25	10.1	8.4	—	—	—	—	0.2	0.2
Stocking control, clean, or release[7]	0.57	26.1	19.8	0.30	13.9	10.5	0.24	11.1	8.5	0.02	0.8	0.6	0.01	0.3	0.2
Clearcut mature stands and replant[8]	0.35	36.8	18.7	0.11	11.8	6.1	0.23	23.9	12.1	0.01	1.1	0.6	—	—	—
Salvage harvest and regenerate[9]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
All treatments earning:															
10 percent or more	1.85	115.0	73.6	0.89	52.9	34.5	0.90	57.8	36.3	0.04	2.9	1.7	0.03	1.5	1.0
less than 10 percent	2.43			1.23			1.11			0.02			0.06		
Natural pine stands															
Regenerate with site preparation[2]	1.45	116.7	83.0	0.29	24.5	16.8	1.00	79.2	57.1	0.06	5.5	3.8	0.09	7.5	5.4
Regenerate without site preparation[3]	0.11	5.3	5.9	0.02	0.7	0.9	0.09	4.6	5.0	—	—	—	—	—	—
Convert stand to preferred species[4]	0.20	17.0	9.9	0.03	2.8	1.5	0.15	13.0	7.7	0.01	1.0	0.6	—	0.2	0.1
Precommercial thin seedlings and saplings[5]	0.16	6.6	6.8	0.04	1.8	1.8	0.11	4.2	4.4	0.01	0.4	0.4	—	0.2	0.2
Commercial thin poletimber stands[6]	3.28	148.3	142.7	0.75	34.0	32.9	2.26	102.1	98.7	0.17	8.1	6.9	0.09	4.1	4.1
Stocking control, clean, or release[7]	2.32	114.0	98.6	0.49	23.4	21.3	1.65	81.5	70.1	0.08	4.4	3.3	0.09	4.7	3.9
Clearcut mature stands and replant[8]	4.58	478.3	297.5	1.04	111.0	68.6	2.59	268.3	169.8	0.78	81.6	48.2	0.18	17.4	10.9
Salvage harvest and regenerate[9]	0.43	47.0	24.9	0.10	10.7	5.8	0.28	31.4	16.4	0.02	2.1	1.2	0.03	2.8	1.6
All treatments earning:															
10 percent or more	12.53	933.2	669.4	2.75	208.8	149.5	8.14	584.3	429.2	1.14	103.2	64.5	0.49	36.8	26.2
less than 10 percent	3.15			0.50			2.20			0.18			0.27		

Table 5.4—Opportunities for increasing timber supplies in the South that will yield 10 percent[1] or more by ownership, forest management type, and treatment opportunity—Continued

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
Pine–hardwood stands															
Regenerate with site preparation[2]	1.43	176.1	91.4	0.29	35.8	18.7	1.07	131.4	68.0	0.05	5.6	2.9	0.03	3.3	1.7
Regenerate without site preparation[3]	0.08	3.9	4.6	0.03	1.3	1.6	0.05	2.6	2.9	—	—	—	—	0.1	0.1
Convert stand to preferred species[4]	0.25	19.6	13.5	0.04	3.8	2.7	0.18	14.1	9.8	0.01	0.7	0.5	0.01	1.0	0.6
Precommercial thin seedlings and saplings[5]	—	—	0.1	—	—	0.1	—	—	—	—	—	—	—	—	—
Commercial thin poletimber stands[6]	0.42	18.8	19.2	0.13	6.1	6.3	0.26	11.4	11.6	0.02	1.1	1.0	—	0.2	0.2
Stocking control, clean, or release[7]	2.06	95.6	96.3	0.45	20.9	21.2	1.49	68.9	69.6	0.09	4.4	4.2	0.03	1.3	1.3
Clearcut mature stands and replant[8]	1.32	134.7	83.1	0.26	27.0	16.8	0.82	84.0	52.1	0.17	17.2	10.2	0.07	6.5	4.0
Salvage harvest and regenerate[9]	0.22	23.7	12.9	0.06	6.7	3.6	0.15	15.4	8.5	0.01	1.6	0.8	—	—	—
All treatments earning:															
10 percent or more	5.78	472.4	321.0	1.27	101.6	70.9	4.02	327.8	222.6	0.35	30.6	19.6	0.14	12.4	7.9
less than 10 percent	5.11			0.86			3.64			0.32			0.28		
Upland hardwood stands															
Regenerate with site preparation[2]	3.34	408.6	225.0	0.74	93.6	50.5	2.49	302.6	167.7	0.05	5.8	3.3	0.05	6.6	3.5
Regenerate without site preparation[3]	0.40	19.6	24.4	0.13	6.4	8.2	0.25	12.4	15.4	—	0.1	0.1	0.01	0.7	0.7
Convert stand to preferred species[4]	0.44	52.1	28.1	0.07	8.0	4.4	0.37	42.9	23.1	0.01	0.9	0.4	—	0.3	0.2
Precommercial thin seedlings and saplings[5]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Commercial thin poletimber stands[6]	0.09	3.6	4.6	0.01	0.2	0.3	0.08	3.1	3.9	—	0.1	0.1	0.01	0.2	0.3
Stocking control, clean, or release[7]	0.21	8.2	11.4	0.02	0.8	1.1	0.18	7.2	9.9	—	—	—	0.01	0.2	0.3
Clearcut mature stands and replant[8]	3.77	493.0	211.2	0.26	34.6	16.5	2.65	349.6	150.2	0.75	93.9	37.9	0.11	14.9	6.7
Salvage harvest and regenerate[9]	0.37	53.8	25.4	0.06	8.5	3.9	0.29	41.7	19.7	0.01	1.7	0.8	0.01	1.8	0.9
All treatments earning:															
10 percent or more	8.61	1,039.0	530.1	1.29	152.2	84.9	6.31	759.5	389.9	0.82	102.6	42.7	0.21	24.8	12.6
less than 10 percent	21.66			2.23			17.34			1.35			0.73		

Table 5.4—Opportunities for increasing timber supplies in the South that will yield 10 percent[1] or more by ownership, forest management type, and treatment opportunity—Continued

	All ownerships			Forest industry			Other private			National forest			Other public		
Forest type and treatment opportunity	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
Bottomland hardwood stands															
Regenerate with site preparation[2]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Regenerate without site preparation[3]	0.27	—	5.5	0.07	—	1.4	0.17	—	3.4	—	—	—	0.03	—	0.7
Convert stand to referred species[4]	0.44	19.7	12.3	0.09	3.9	2.4	0.33	14.6	9.2	—	0.2	0.1	0.02	1.1	0.6
Precommercial thin seedlings and saplings[5]	—	0.2	0.1	—	—	—	—	0.2	0.1	—	—	—	—	—	—
Commercial thin poletimber stands[6]	0.09	3.2	1.4	0.02	0.8	0.4	0.06	2.3	1.0	—	—	—	—	0.2	0.1
Stocking control, clean, or release[7]	1.22	57.5	21.5	0.26	12.9	4.5	0.87	40.4	15.4	0.02	1.1	0.4	0.07	3.1	1.1
Clearcut mature stands and replant[8]	2.91	135.3	75.5	0.78	36.4	20.3	1.94	89.8	50.2	0.08	3.9	1.9	0.11	5.1	3.0
Salvage harvest and regenerate[9]	0.96	49.4	24.1	0.20	10.4	5.0	0.64	33.1	16.1	0.01	0.5	0.3	0.11	5.5	2.7
All treatments earning:															
10 percent or more	5.90	265.4	140.4	1.42	64.4	34.1	4.02	180.3	95.5	0.12	5.7	2.6	0.34	15.0	8.2
less than 10 percent	11.06			2.10			8.13			0.12			0.70		

[1] Yields measured in constant dollars, net of inflation or deflation. Economic returns do not include land costs, ad valorem taxes, or income taxes.

[2] Nonstocked or cutover sites with competing vegetation and requiring site preparation prior to regeneration.

[3] Nonstocked or cutover sites without significant competing vegetation not requiring site preparation for regeneration.

[4] Sites stocked with low-quality trees or off-site species requiring conversion to preferred species to improve productivity.

[5] Sites densely stocked with seedlings and/or saplings requiring precommercial thinning or similar treatments to reduce stocking and favor potential crop trees.

[6] Sites densely stocked with immature but merchantable trees.

[7] Sites adequately stocked with trees, but with inhibiting vegetation.

[8] Sites with mature or overmature sawtimber size trees.

[9] Sites with merchantable trees excessively damaged by fire, insects, disease, wind, ice, or other destructive agents.

Table 5.5—Opportunities for increasing timber supplies in the Southeast that will yield 10 percent[1] or more by ownership, forest management type, and treatment opportunity

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
All forest types															
Regenerate with site preparation[2]	3.12	254.1	175.4	0.51	38.9	27.3	2.35	194.9	133.4	0.11	8.6	6.1	0.15	11.7	8.5
Regenerate without site preparation[3]	0.55	22.5	29.2	0.26	10.5	13.9	0.26	10.8	14.0	0.02	0.8	1.0	0.01	0.3	0.4
Convert stand to preferred species[4]	0.82	65.4	38.5	0.13	10.6	6.2	0.65	52.2	30.8	0.01	0.6	0.4	0.03	2.0	1.1
Precommercial thin seedlings and saplings[5]	0.20	8.0	7.6	0.05	2.1	1.9	0.13	5.1	5.0	0.01	0.3	0.3	0.01	0.4	0.3
Commercial thin poletimber stands[6]	2.26	99.3	93.6	0.43	18.6	16.9	1.67	73.8	70.1	0.06	2.7	2.5	0.10	4.2	4.1
Stocking control, clean, or release[7]	2.80	135.2	105.0	0.49	23.7	16.1	2.08	100.2	80.9	0.08	4.3	2.8	0.14	7.0	5.1
Clearcut mature stands and replant[8]	7.54	716.7	356.8	0.99	70.0	38.6	5.20	504.9	252.1	1.02	110.9	49.5	0.33	31.0	16.6
Salvage harvest and regenerate[9]	0.37	33.9	18.6	0.07	5.9	3.2	0.26	24.3	13.2	0.01	1.2	0.6	0.03	2.6	1.5
All treatments earning:															
10 percent or more	17.66	1,335.0	824.6	2.93	180.4	124.2	12.61	966.3	599.6	1.31	129.3	63.2	0.80	59.1	37.6
less than 10 percent	19.30			3.23			14.14			0.93			1.00		
Nonstocked land															
Regenerate with site preparation[2]	1.26	69.5	63.3	0.26	14.6	13.0	0.89	49.1	44.9	0.05	2.6	2.5	0.06	3.2	2.9
Regenerate without site preparation[3]	0.38	15.2	20.2	0.20	8.2	10.8	0.15	6.1	8.2	0.02	0.8	1.0	—	0.1	0.2
Convert stand to preferred species[4]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Precommercial thin seedlings and saplings[5]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Commercial thin poletimber stands[6]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Stocking control, clean, or release[7]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Clearcut mature stands and replant[8]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Salvage harvest and regenerate[9]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
All treatments earning:															
10 percent or more	1.64	84.7	83.5	0.46	22.8	23.8	1.05	55.2	53.1	0.07	3.4	3.5	0.06	3.3	3.1
less than 10 percent	1.85			0.27			1.36			0.06			0.16		

Table 5.5—Opportunities for increasing timber supplies in the Southeast that will yield 10 percent[1] or more by ownership, forest management type, and treatment opportunity—Continued

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
Pine plantations															
Regenerate with site preparation[2]	0.08	5.5	3.2	0.02	1.6	1.0	0.05	3.8	2.1	—	—	—	—	0.1	0.1
Regenerate without site preparation[3]	0.03	1.0	1.0	0.01	0.4	0.4	0.01	0.5	0.5	—	—	—	—	0.1	0.1
Convert stand to preferred species[4]	0.02	1.7	0.8	—	0.4	0.2	0.01	0.8	0.4	—	—	—	0.01	0.5	0.3
Precommercial thin seedlings and saplings[5]	0.06	2.4	1.8	0.03	1.2	0.9	0.02	0.8	0.6	—	0.2	0.1	0.01	0.2	0.2
Commercial thin poletimber stands[6]	0.30	12.6	10.1	0.12	5.3	4.2	0.17	7.0	5.7	—	—	—	—	0.2	0.2
Stocking control, clean, or release[7]	0.18	8.0	6.2	0.10	4.3	3.3	0.07	3.2	2.5	—	0.2	0.2	0.01	0.3	0.2
Clearcut mature stands and replant[8]	0.01	1.0	0.5	—	0.2	0.1	0.01	0.8	0.4	—	—	—	—	—	—
Salvage harvest and regenerate[9]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
All treatments earning:															
10 percent or more	0.66	32.1	23.5	0.29	13.4	10.1	0.34	17.0	12.1	0.01	0.4	0.3	0.03	1.4	0.9
less than 10 percent	1.52			0.79			0.68			0.01			0.04		
Natural pine stands															
Regenerate with site preparation[2]	0.73	50.7	39.8	0.08	5.6	4.4	0.54	37.0	29.4	0.03	2.5	1.9	0.07	5.6	4.1
Regenerate without site preparation[3]	0.04	2.0	2.4	—	0.2	0.2	0.04	1.8	2.2	—	0.0	—	—	0.0	—
Convert stand to preferred species[4]	0.13	9.7	5.7	0.02	1.5	0.9	0.10	7.9	4.7	—	0.1	0.1	—	0.2	0.1
Precommercial thin seedlings and saplings[5]	0.14	5.4	5.6	0.02	0.9	0.9	0.11	4.2	4.4	—	0.2	0.2	—	0.2	0.2
Commercial thin poletimber stands[6]	1.84	81.8	79.8	0.27	12.1	11.8	1.42	63.4	61.7	0.06	2.6	2.5	0.09	3.7	3.8
Stocking control, clean, or release[7]	1.38	69.2	57.7	0.15	7.4	6.1	1.10	54.9	46.3	0.04	2.5	1.7	0.09	4.4	3.6
Clearcut mature stands and replant[8]	1.33	125.6	78.3	0.12	10.8	6.9	0.93	89.7	56.3	0.18	16.2	9.6	0.10	8.8	5.4
Salvage harvest and regenerate[9]	0.21	20.8	11.4	0.05	4.6	2.5	0.12	12.9	7.0	0.01	0.8	0.5	0.03	2.5	1.4
All treatments earning:															
10 percent or more	5.79	365.1	280.7	0.72	43.0	33.7	4.36	271.8	212.0	0.33	24.9	16.4	0.38	25.4	18.7
less than 10 percent	2.38			0.37			1.66			0.13			0.23		

Table 5.5—Opportunities for increasing timber supplies in the Southeast that will yield 10 percent[1] or more by ownership, forest management type, and treatment opportunity—Continued

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
Pine–hardwood stands															
Regenerate with site preparation[2]	0.33	40.2	20.4	0.04	4.7	2.4	0.27	32.8	16.7	0.01	1.6	0.8	0.01	1.1	0.5
Regenerate without site preparation[3]	0.02	1.0	1.4	0.01	0.6	0.9	0.01	0.3	0.4	—	—	—	—	0.1	0.1
Convert stand to preferred species[4]	0.17	12.0	8.4	0.02	1.4	1.0	0.14	9.9	6.9	—	0.3	0.2	—	0.3	0.2
Precommercial thin seedlings and saplings[5]	—	—	0.1	—	—	0.1	—	0.0	—	—	—	—	—	—	—
Commercial thin poletimber stands[6]	0.05	2.1	2.3	0.01	0.6	0.6	0.03	1.5	1.6	—	—	—	—	—	—
Stocking control, clean, or release[7]	0.69	31.8	31.0	0.09	4.2	3.9	0.57	26.1	25.7	0.02	0.8	0.7	0.01	0.7	0.6
Clearcut mature stands and replant[8]	0.71	67.7	41.2	0.09	8.0	5.2	0.47	44.7	27.3	0.09	9.3	5.2	0.06	5.7	3.5
Salvage harvest and regenerate[9]	0.05	4.6	2.6	—	0.3	0.2	0.04	4.0	2.3	—	0.4	0.2	—	—	—
All treatments earning:															
10 percent or more	2.02	159.4	107.4	0.27	19.8	14.2	1.52	119.4	80.9	0.13	12.3	7.2	0.09	7.9	5.1
less than 10 percent	2.46			0.29			1.85			0.13			0.19		
Upland hardwood stands															
Regenerate with site preparation[2]	0.72	88.2	48.6	0.10	12.5	6.6	0.59	72.2	40.2	0.01	1.8	1.0	0.01	1.7	0.8
Regenerate without site preparation[3]	0.08	3.3	4.3	0.03	1.2	1.6	0.05	2.1	2.7	—	—	—	—	—	—
Convert stand to preferred species[4]	0.31	33.2	18.3	0.05	5.6	3.1	0.25	27.3	15.0	—	—	—	—	0.3	0.2
Precommercial thin seedlings and saplings[5]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Commercial thin poletimber stands[6]	0.01	0.3	0.5	—	—	—	0.01	0.3	0.5	—	—	—	—	—	—
Stocking control, clean, or release[7]	0.02	0.9	1.2	—	0.2	0.2	0.02	0.6	0.9	—	—	—	—	0.1	0.1
Clearcut mature stands and replant[8]	3.35	426.6	182.6	0.20	24.9	11.8	2.37	306.1	131.9	0.67	82.3	33.1	0.10	13.3	5.8
Salvage harvest and regenerate[9]	0.04	5.1	2.8	—	0.2	0.1	0.04	4.9	2.7	—	—	—	—	0.1	—
All treatments earning:															
10 percent or more	4.53	557.6	258.4	0.38	44.6	23.4	3.33	413.5	193.9	0.69	84.1	34.1	0.12	15.4	7.0
less than 10 percent	7.24			0.63			5.81			0.56			0.24		

Table 5.5—Opportunities for increasing timber supplies in the Southeast that will yield 10 percent[1] or more by ownership, forest management type, and treatment opportunity—Continued

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treat- ment	Net annual growth incre- ment	Area	Cost of treat- ment	Net annual growth incre- ment	Area	Cost of treat- ment	Net annual growth incre- ment	Area	Cost of treat- ment	Net annual growth incre- ment	Area	Cost of treat- ment	Net annual growth incre- ment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
Bottomland hardwood stands															
Regenerate with site preparation[2]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Regenerate without site preparation[3]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Convert stand to preferred species[4]	0.21	8.8	5.2	0.04	1.7	1.0	0.15	6.3	3.8	—	0.2	0.1	0.01	0.7	0.3
Precommercial thin seedlings and saplings[5]	—	0.2	0.1	—	—	—	—	0.2	0.1	—	—	—	—	—	—
Commercial thin poletimber stands[6]	0.06	2.4	1.0	0.02	0.6	0.3	0.04	1.6	0.7	—	—	—	—	0.2	0.1
Stocking control, clean, or release[7]	0.52	25.3	8.7	0.15	7.7	2.5	0.33	15.4	5.5	0.02	0.8	0.3	0.03	1.6	0.5
Clearcut mature stands and replant[8]	2.15	95.9	54.2	0.58	26.0	14.7	1.43	63.5	36.2	0.07	3.2	1.5	0.07	3.2	1.8
Salvage harvest and regenerate[9]	0.08	3.4	1.7	0.02	0.8	0.5	0.05	2.5	1.2	—	—	—	—	0.1	—
All treatments earning:															
10 percent or more	3.02	136.1	71.0	0.81	36.8	18.9	2.00	89.4	47.5	0.09	4.2	1.8	0.12	5.7	2.8
less than 10 percent	3.84			0.88			2.78			0.04			0.15		

[1] Yields measured in constant dollars, net of inflation or deflation. Economic returns do not include land costs, ad valorem taxes, or income taxes.

[2] Nonstocked or cutover sites with competing vegetation and requiring site preparation prior to regeneration.

[3] Nonstocked or cutover sites without significant competing vegetation not requiring site preparation for regeneration.

[4] Sites stocked with low-quality trees or off-site species requiring conversion to preferred species to improve productivity.

[5] Sites densely stocked with seedlings and/or saplings requiring precommercial thinning or similar treatments to reduce stocking and favor potential crop trees.

[6] Sites densely stocked with immature but merchantable trees.

[7] Sites adequately stocked with trees, but with inhibiting vegetation.

[8] Sites with mature or overmature sawtimber size trees.

[9] Sites with merchantable trees excessively damaged by fire, insects, disease, wind, ice, or other destructive agents.

Table 5.6—Opportunities for increasing timber supplies in the South Central region that will yield 10 percent[1] or more by ownership, forest management type, and treatment opportunity

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
All forest types															
Regenerate with site preparation[2]	4.65	540.5	300.5	1.22	141.8	78.3	3.24	377.8	210.3	0.11	11.8	6.8	0.08	9.1	5.1
Regenerate without site preparation[3]	0.78	25.8	36.0	0.24	8.8	12.0	0.49	16.2	22.4	—	0.1	0.1	0.04	0.7	1.4
Convert stand to preferred species[4]	0.54	47.1	27.1	0.12	10.6	6.0	0.39	33.2	19.3	0.02	2.2	1.2	0.01	1.0	0.6
Precommercial thin seedlings and saplings[5]	0.08	3.4	2.8	0.05	2.2	1.9	0.02	0.9	0.7	0.01	0.3	0.2	—	—	—
Commercial thin poletimber stands[6]	2.09	94.2	90.5	0.71	31.7	30.5	1.23	55.1	53.6	0.14	6.6	5.6	0.02	0.8	0.8
Stocking control, clean, or release[7]	3.58	166.2	142.6	1.04	48.3	42.7	2.35	108.9	92.6	0.14	6.5	5.6	0.06	2.6	1.8
Clearcut mature stands and replant[8]	5.40	561.3	329.2	1.47	150.8	89.6	3.03	310.7	182.4	0.76	86.8	49.2	0.14	13.0	8.0
Salvage harvest and regenerate[9]	1.61	140.0	68.8	0.34	30.3	15.1	1.10	97.4	47.6	0.05	4.7	2.5	0.12	7.5	3.6
All treatments earning:															
10 percent or more	18.73	1,578.5	997.6	5.18	424.5	276.2	11.84	1,000.3	628.8	1.23	119.1	71.3	0.47	34.6	21.3
less than 10 percent	25.98			3.97			19.69			1.13			1.19		
Nonstocked land															
Regenerate with site preparation[2]	0.02	1.1	1.0	0.01	0.4	0.3	0.01	0.7	0.7	—	—	—	—	—	—
Regenerate without site preparation[3]	0.06	2.8	3.3	0.04	1.9	2.3	0.02	0.9	1.0	—	—	—	—	—	—
Convert stand to preferred species[4]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Precommercial thin seedlings and saplings[5]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Commercial thin poletimber stands[6]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Stocking control, clean, or release[7]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Clearcut mature stands and replant[8]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Salvage harvest and regenerate[9]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
All treatments earning:															
10 percent or more	0.07	3.9	4.2	0.04	2.2	2.6	0.03	1.6	1.7	—	—	—	—	—	—
less than 10 percent	0.03			—			0.03			—			—		

Table 5.6—Opportunities for increasing timber supplies in the South Central region that will yield 10 percent[1] or more by ownership, forest management type, and treatment opportunity—Continued

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment	Area	Cost of treatment	Net annual growth increment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
Pine plantations															
Regenerate with site preparation[2]	0.20	17.0	9.0	0.12	10.2	5.4	0.07	5.9	3.1	0.01	0.8	0.4	—	0.1	0.1
Regenerate without site preparation[3]	0.01	0.5	0.4	0.01	0.5	0.4	—	—	—	—	—	—	—	—	—
Convert stand to preferred species[4]	0.02	2.3	1.1	0.02	2.3	1.1	—	—	—	—	—	—	—	—	—
Precommercial thin seedlings and saplings[5]	0.05	2.1	1.6	0.03	1.3	1.0	0.02	0.8	0.6	—	—	—	—	—	—
Commercial thin poletimber stands[6]	0.18	7.0	6.1	0.10	3.9	3.4	0.08	3.1	2.7	—	—	—	—	—	—
Stocking control, clean, or release[7]	0.38	18.1	13.6	0.20	9.6	7.2	0.17	7.9	6.0	0.01	0.6	0.4	—	—	—
Clearcut mature stands and replant[8]	0.34	35.9	18.3	0.11	11.6	6.0	0.22	23.1	11.7	0.01	1.1	0.6	—	—	—
Salvage harvest and regenerate[9]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
All treatments earning:															
10 percent or more	1.19	82.9	50.1	0.60	39.5	24.4	0.56	40.8	24.2	0.03	2.5	1.4	—	0.1	0.1
less than 10 percent	0.90			0.45			0.43			0.01			0.01		
Natural pine stands															
Regenerate with site preparation[2]	0.72	66.0	43.2	0.21	19.0	12.4	0.46	42.1	27.7	0.03	3.0	1.9	0.02	1.9	1.2
Regenerate without site preparation[3]	0.07	3.3	3.5	0.01	0.5	0.7	0.05	2.8	2.8	—	—	—	—	—	—
Convert stand to preferred species[4]	0.07	7.3	4.2	0.01	1.3	0.6	0.05	5.1	3.0	0.01	0.9	0.5	—	—	—
Precommercial thin seedlings and saplings[5]	0.03	1.2	1.2	0.02	0.9	0.9	—	0.1	0.1	0.01	0.3	0.2	—	—	—
Commercial thin poletimber stands[6]	1.44	66.5	62.9	0.47	21.9	21.1	0.84	38.7	37.0	0.11	5.5	4.5	0.01	0.4	0.3
Stocking control, clean, or release[7]	0.94	44.8	40.9	0.34	16.0	15.2	0.55	26.6	23.8	0.04	1.9	1.6	0.01	0.3	0.3
Clearcut mature stands and replant[8]	3.26	352.7	219.2	0.92	100.1	61.7	1.66	178.6	113.5	0.60	65.5	38.6	0.08	8.5	5.5
Salvage harvest and regenerate[9]	0.23	26.2	13.5	0.05	6.0	3.3	0.16	18.6	9.3	0.01	1.2	0.7	—	0.3	0.2
All treatments earning:															
10 percent or more	6.74	568.0	388.7	2.03	165.8	115.8	3.78	312.5	217.2	0.81	78.3	48.1	0.12	11.4	7.5
less than 10 percent	0.76			0.13			0.55			0.05			0.03		

Table 5.6—Opportunities for increasing timber supplies in the South Central region that will yield 10 percent[1] or more by ownership, forest management type, and treatment opportunity—Continued

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
Pine–hardwood stands															
Regenerate with site preparation[2]	1.10	136.0	71.0	0.25	31.1	16.4	0.80	98.6	51.3	0.04	4.0	2.2	0.02	2.2	1.2
Regenerate without site preparation[3]	0.06	2.9	3.2	0.01	0.6	0.7	0.05	2.3	2.5	—	—	—	—	—	—
Convert stand to preferred species[4]	0.08	7.6	5.1	0.03	2.4	1.7	0.04	4.2	2.8	—	0.4	0.2	0.01	0.6	0.4
Precommercial thin seedlings and saplings[5]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Commercial thin poletimber stands[6]	0.37	16.6	16.9	0.12	5.4	5.6	0.22	9.9	10.1	0.02	1.1	1.0	—	0.2	0.2
Stocking control, clean, or release[7]	1.37	63.8	65.2	0.36	16.8	17.3	0.92	42.8	43.9	0.08	3.6	3.4	0.01	0.6	0.7
Clearcut mature stands and replant[8]	0.61	67.0	41.8	0.17	19.0	11.6	0.36	39.3	24.8	0.07	7.9	4.9	0.01	0.8	0.5
Salvage harvest and regenerate[9]	0.17	19.1	10.3	0.06	6.4	3.4	0.10	11.4	6.3	0.01	1.3	0.7	—	—	—
All treatments earning:															
10 percent or more	3.76	312.9	213.5	1.00	81.8	56.7	2.49	208.4	141.6	0.22	18.3	12.4	0.05	4.5	2.8
less than 10 percent	2.65			0.57			1.79			0.19			0.10		
Upland hardwood stands															
Regenerate with site preparation[2]	2.62	320.4	176.4	0.64	81.1	44.0	1.90	230.4	127.5	0.03	4.0	2.3	0.04	4.9	2.6
Regenerate without site preparation[3]	0.32	16.4	20.1	0.10	5.3	6.6	0.20	10.3	12.7	—	0.1	0.1	0.01	0.7	0.7
Convert stand to preferred species[4]	0.14	18.9	9.7	0.02	2.4	1.3	0.11	15.6	8.0	0.01	0.9	0.4	—	—	—
Precommercial thin seedlings and saplings[5]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Commercial thin poletimber stands[6]	0.08	3.3	4.1	0.01	0.2	0.3	0.07	2.7	3.4	—	0.1	0.1	0.01	0.2	0.3
Stocking control, clean, or release[7]	0.19	7.4	10.1	0.02	0.7	0.9	0.17	6.6	9.0	—	—	—	—	0.2	0.2
Clearcut mature stands and replant[8]	0.42	66.4	28.7	0.06	9.7	4.7	0.27	43.5	18.4	0.07	11.6	4.8	0.01	1.6	0.8
Salvage harvest and regenerate[9]	0.33	48.7	22.6	0.05	8.3	3.9	0.25	36.9	17.1	0.01	1.7	0.8	0.01	1.8	[illegible]
All treatments earning:															
10 percent or more	4.09	481.5	271.7	0.90	107.6	61.5	2.97	346.0	196.1	0.13	18.5	8.5	0.08	9.3	5.6
less than 10 percent	14.42			1.60			11.53			0.80			0.49		

Table 5.6—Opportunities for increasing timber supplies in the South Central region that will yield 10 percent[1] or more by ownership, forest management type, and treatment opportunity—Continued

Forest type and treatment opportunity	All ownerships			Forest industry			Other private			National forest			Other public		
	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment	Area	Cost of treat-ment	Net annual growth incre-ment
	Million acres	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*	*Million acres*	*Million dollars*	*Million cubic ft*
Bottomland hardwood stands															
Regenerate with site preparation[2]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Regenerate without site preparation[3]	0.27	—	5.5	0.07	—	1.4	0.17	—	3.4	—	—	—	0.03	—	0.7
Convert stand to preferred species[4]	0.23	10.9	7.1	0.05	2.2	1.4	0.18	8.3	5.4	—	—	—	0.01	0.4	0.2
Precommercial thin seedlings and saplings[5]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Commercial thin poletimber stands[6]	0.02	0.9	0.4	0.01	0.2	0.1	0.02	0.7	0.3	—	—	—	—	—	—
Stocking control, clean, or release[7]	0.70	32.2	12.7	0.11	5.2	2.1	0.54	25.0	9.9	0.01	0.4	0.1	0.03	1.5	0.6
Clearcut mature stands and replant[8]	0.77	39.3	21.2	0.20	10.4	5.7	0.51	26.3	14.0	0.01	0.6	0.4	0.04	2.0	1.2
Salvage harvest and regenerate[9]	0.88	46.0	22.4	0.18	9.5	4.6	0.59	30.6	14.9	0.01	0.5	0.3	0.10	5.4	2.6
All treatments earning:															
10 percent or more	2.88	129.3	69.3	0.61	27.6	15.2	2.01	90.9	48.0	0.03	1.5	0.8	0.22	9.3	5.4
less than 10 percent	7.22			1.22			5.35			0.09			0.55		

[1] Yields measured in constant dollars, net of inflation or deflation. Economic returns do not include land costs, ad valorem taxes, or income taxes.

[2] Nonstocked or cutover sites with competing vegetation and requiring site preparation prior to regeneration.

[3] Nonstocked or cutover sites without significant competing vegetation not requiring site preparation for regeneration.

[4] Sites stocked with low-quality trees or off-site species requiring conversion to preferred species to improve productivity.

[5] Sites densely stocked with seedlings and/or saplings requiring precommercial thinning or similar treatments to reduce stocking and favor potential crop trees.

[6] Sites densely stocked with immature but merchantable trees.

[7] Sites adequately stocked with trees, but with inhibiting vegetation.

[8] Sites with mature or overmature sawtimber size trees.

[9] Sites with merchantable trees excessively damaged by fire, insects, disease, wind, ice, or other destructive agents.

List of Figures

Frontispiece—The South, States and regions

Chapter 1—The Economic Importance of Forests in the South

Page

1.1—Area of timberland in the South, by region and forest management type, 1985 . . . 12

1.2—Area of timberland in the South, by region and forest ownership, 1985 . . . 13

1.3—Volume of roundwood output in the South, by product and species group, 1984 . . . 15

1.4—Value at local points of delivery of roundwood timber products in the South, by region and species group, 1984 . . . 17

1.5—Value at local points of delivery of roundwood timber products and the highest valued agricultural crops in the South, 1984 . . . 19

1.6—Ranking of the value of roundwood timber products with major agricultural crops in the South, 1984 . . . 19

1.7—Employment and wages and salaries in manufacturing in the South, by industry, 1982 . . . 21

1.8—Ranking of forest industry wages and salaries with other manufacturing industries in the South, 1982 . . . 22

1.9—Distribution of employment among forest industry sectors in the South, 1982 . . . 23

1.10—Distribution of wages and salaries among forest industry sectors in the South, 1982 . . . 24

1.11—Employment in forest industries in the South, 1947–82 . . . 26

1.12—Wages and salaries in forest industries in the South, 1947–82 . . . 26

1.13—Timber removals in the South, by softwoods and hardwoods, 1952–84 . . . 27

Chapter 2—The Changing Forest Resources and Forest Industries in the South

2.1—Rosin production in the United States, by source, selected years 1900–84 . . . 33

2.2—Turpentine production in the United States, by type, selected years 1900–84 . . . 34

2.3—Lumber production in the South, by softwoods and hardwoods 1869–1984, and by major species, 1869–1965 . . . 36

2.4—Expenditures for protection from wildfire and area burned in the South, selected years 1916–83 . . . 44

2.5—Regeneration in the South, by ownership, 1925–85 . . . 49

2.6—Federal funds allocated for research to Forest Experiment Stations in the South, 1929–86 . . . 52

2.7—Federal and State expenditures for forest management assistance in the South, 1951–85 . . . 60

2.8—Forest Service and State expenditures for insect and disease management in the South, 1965–84 . . . 64

2.9—Number of States with special forest tax laws in the South, by type of tax, 1900–85 . . . 66

2.10—Volume and value of timber cut from National Forest System lands in the South, 1925–85 . . . 69

2.11—Woodpulp production in the South, by type, 1910–84 . . . 72

	Page
2.12—Softwood plywood production in the South, by region, 1964–84	76
2.13—Average stumpage prices for sawtimber on privately owned land in the South, 1880–1985	78
2.14—Average stumpage prices for pulpwood on privately owned land in the South, 1935–85	80

Chapter 3—Projected Changes in the Timber Resource

3.1—Population, economic activity, and income in the United States, 1929–86 with projections to 2030	89
3.2—New housing unit production in the United States, by type of unit, 1950–84, with projections to 2030	93
3.3—Lumber consumption in the United States, 1950–84, with projections to 2030	97
3.4—Structural panel consumption in the United States, by type, 1950–84, with projections to 2030	99
3.5—Nonstructural panel consumption in the United States, by type, 1950–84, with projections to 2030	101
3.6—Pulpwood production in the United States, by source of material, 1950–84, with projections to 2030	104
3.7—Roundwood consumption by product in the United States, 1952–84, with projections to 2030	107
3.8—Roundwood consumption and harvests in the United States, 1952–84, with projections of demand and supplies to 2030	112
3.9—Timberland area in the Southeast region, by State, 1952–85, with projections to 2030	116
3.10—Timberland area in the South Central region, by State, 1952–85, with projections to 2030	117
3.11—Timberland area in the South, by forest ownership, 1952–85, with projections to 2030	120
3.12—Timberland area in the South, by forest management type, 1952–85, with projections to 2030	122
3.13—Proportion of timberland in pine plantation management type	124
3.14—Proportion of timberland in natural pine and mixed pine–hardwood management types	125
3.15—Proportion of timberland in upland hardwood management type	126
3.16—Proportion of timberland in bottomland hardwood management type	127
3.17—Softwood roundwood supplies in the South, by forest ownership, 1952–84, with projections to 2030	134
3.18—Softwood roundwood supplies in the South, by forest management type, 1952–84, with projections to 2030	136
3.19—Softwood roundwood supplies in the Southeast region, by State, 1952–84, with projection to 2030	138
3.20—Softwood roundwood supplies in the South Central region, by State, 1952–84, with projections to 2030	140
3.21—Softwood net annual growth and timber removals in the South, by forest ownership, 1952–84, with projections to 2030	143

Page

3.22—Softwood net annual growth and timber removals in the South, by forest management type, 1952–84, with projections to 2030 144

3.23—Softwood net annual growth and timber removals in the Southeast region, by State, 1952–84, with projections to 2030 146

3.24—Softwood net annual growth and timber removals in the South Central region, by State, 1952–84, with projections to 2030 147

3.25—Percentage change in the number of live pine trees on other private timberland in the Southeast region between the most recent forest surveys, by diameter class 151

3.26—Percentage change in the number of live softwood trees on timberland in the South between the most recent forest surveys, by diameter class 155

3.27—Softwood inventory in the South, by forest ownership, 1952–85, with projections to 2030 157

3.28—Softwood inventory in the South, by forest management type, 1952–85, with projections to 2030 159

3.29—Percentage distribution of softwood growing stock on timberland in the South, by diameter class, 1977 and 1985 160

3.30—Percentage distribution of softwood growing stock on timberland in the South, by species, 1985 161

3.31—Softwood inventory in the Southeast region, by State, 1952–85, with projections to 2030 162

3.32—Softwood inventory in the South Central region, by State, 1952–85, with projections to 2030 163

3.33—Average volume of softwood growing stock in pine and mixed pine–hardwood management types in the South Central region, 1952–85 164

3.34—Hardwood roundwood supplies in the South, by forest ownership, 1952–84, with projections to 2030 169

3.35—Hardwood roundwood supplies in the South, by forest management type, 1952–84, with projections to 2030 170

3.36—Hardwood roundwood supplies in the Southeast region, by State, 1952–84, with projections to 2030 172

3.37—Hardwood roundwood supplies in the South Central region, by State, 1952–84, with projections to 2030 173

3.38—Hardwood net annual growth and timber removals in the South, by forest ownership, 1952–84, with projections to 2030 175

3.39—Hardwood net annual growth and timber removals in the South, by forest management type, 1952–84, with projections to 2030 176

3.40—Hardwood net annual growth and timber removals in the Southeast region, by State, 1952–84, with projections to 2030 178

3.41—Hardwood net annual growth and timber removals in the South Central region, by State, 1952–84, with projections to 2030 180

3.42—Percentage change in the number of live hardwood trees on timberland in the South between the most recent forest surveys, by diameter class 182

3.43—Hardwood inventory in the South, by forest ownership, 1952–85, with projections to 2030 185

Page

3.44—Hardwood inventory in the South, by forest management type, 1952–85, with projections to 2030 187

3.45—Percentage distribution of hardwood growing stock on timberland in the South, by diameter class, 1977 and 1985 188

3.46—Percentage distribution of hardwood growing stock on timberland in the South, by species, 1985 188

3.47—Hardwood inventory in the Southeast region, by State, 1952–85, with projections to 2030 190

3.48—Hardwood inventory in the South Central region, by State, 1952–85, with projections to 2030 192

Chapter 4—Implications of the Base Projections of Changes in the Timber Resource and of Other Selected Futures

4.1—Softwood sawtimber stumpage price indexes in the South, 1880–1985, with base projections by region, 1990–2030 199

4.2—Softwood pulpwood stumpage price indexes in the South, 1935–85, with base projections by region, 1990–2030 200

4.3—Hardwood sawtimber stumpage price indexes in the South, 1905–85 with base projections by region, 1990–2030 201

4.4—Average relative producer price index for lumber, 1800–1984, with base projections for softwood and hardwood lumber price indexes for selected years 1990–2030 202

4.5—Employment in lumber and wood products and pulp and paper products industries in the South, selected years 1954–85, with projections to 2030 204

4.6—Wages and salaries in lumber and wood products and pulp and paper products industries in the South, selected years 1954–85, with projections to 2030 204

4.7—Projections of softwood lumber and sawtimber stumpage price indexes in the South, with and without additional improvements in processing efficiency 212

4.8—Projections of roundwood pulpwood consumption in the South, with and without increased exports of timber products 214

4.9—Projections of employment in the pulp and paper products industry in the South, with and without increased imports of timber products 215

4.10—Projections of softwood inventories on private timberland in the South, with and without reduced timber growth 217

4.11—Projections of softwood pulpwood stumpage price indexes in the Southeast, with and without reduced timber growth 218

4.12—Projections of employment in the lumber and wood products industry in the South, with and without reduced timber growth 219

4.13—Projections of softwood sawtimber stumpage price indexes in the Pacific Northwest, with and without reduced national forest timber harvest 220

4.14—Projections of softwood inventories on private timberland in the South, with and without utilizing the economic opportunities on cropland and pasture 222

4.15—Projections of softwood inventories on private ownerships in the South with and without utilizing the economic opportunities on private timberland 223

4.16—Projections of softwood inventories on private ownerships in the South, with and without utilizing the economic opportunities on private timberland, cropland, and pasture 224

Page

4.17—Projections of softwood sawtimber stumpage price indexes in the South, with and without utilizing the economic opportunities on private timberland, cropland, and pasture . . . 225

4.18—Projections of softwood pulpwood stumpage price indexes in the Southeast region, with and without utilizing the economic opportunities on private timberland, cropland, and pasture . . . 226

4.19—Projections of softwood net annual growth on private ownerships in the Pacific Northwest, with and without increased management intensity on forest industry timberlands in the Douglas-fir region . . . 227

Chapter 5—Opportunities for Increasing Timber Supplies Through More Intensive Forestry

5.1—Sub-State regions used in analyzing economic treatment opportunities . . . 234

5.2—Area of timberland with economic opportunities to increase net annual growth in the South, by region . . . 239

5.3—Area of timberland with economic opportunities to increase net annual growth in the South, by ownership . . . 240

5.4—Area of timberland with economic opportunities to increase net annual growth in the South, by treatment . . . 240

5.5—Economic opportunities to increase current net annual growth on timberland in the South . . . 241

5.6—Economic opportunities to increase current net annual growth on timberland in the South, by ownership . . . 241

5.7—Economic opportunities to increase current net annual growth on timberland in the South, by treatment . . . 242

5.8—Investment opportunities to increase current net annual growth on timberland in the South, by treatment . . . 244

5.9—Area of timberland with economic oppor tunities to increase net annual growth in the South, by rate of return and ownership . . . 246

5.10—Area of timberland with economic opportunities to increase net annual growth in the South, by rate of return and forest management type . . . 246

5.11—Area of timberland with economic opportunities to increase net annual growth in the South, by rate of return and treatment . . . 247

5.12—Economic opportunities to increase net annual growth on timberland in the South, by rate of return and ownership . . . 247

5.13—Economic opportunities to increase net annual growth on timberland in the South, by rate of return and forest management type . . . 247

5.14—Economic opportunities to increase net annual growth on timberland in the South, by rate of return and treatment . . . 248

5.15—Potential net annual growth from planted pine or naturally regenerated pine and hardwoods on marginal cropland and pasture in the South, by region . . . [illegible]

5.16—Potential net annual growth from pine plantations established on highly erodible cropland in the South, by region . . . [illegible]

5.17—Economic opportunities to increase current net annual timber growth in the South . . . [illegible]

List of Tables Within Chapters

Chapter 3—Projected Changes in the Timber Resource

Page

3.1—Acreage cell categories used in the Timber Resource Inventory Model 85

3.2—Population, gross national product, and disposable personal income in the United States, specified years 1929–85, with projections to 2030 88

3.3—Average annual production of new housing units in the United States, by type of unit, specified periods 1950–84, with projections to 2030 92

3.4—Lumber consumption, exports, imports, and production in the United States, specified years 1952–84, with projections to 2030 96

3.5—Structural panel consumption, exports, imports, and production in the United States, by type of panel, specified years 1952–84, with projections to 2030 98

3.6—Nonstructural panel consumption, exports, imports, and production in the United States, by type of panel, specified years 1952–84, with projections to 2030 100

3.7—Pulpwood consumption, exports, imports, and production in the United States, specified years 1952–84, with projections to 2030 103

3.8—Roundwood consumption in the United States, by species group and product, specified years 1952–84, with projections of demand to 2030 106

3.9—Timber demand, exports, imports, and demand on timberland in the United States, by species group, specified years 1952–84, with projections to 2030 110

3.10—Area of timberland, by ownership and forest management type in the South, selected years 1952–85, with projections to 2030 113

3.11—Timberland with high or medium potential for conversion to cropland in the South, by State and region, 1982 115

3.12—Area of highly erodible cropland suitable for tree planting in the South, by region and State 118

3.13—Area of cropland and pasture in the South, including highly erodible cropland, that would yield higher rates of return in pine plantations 118

3.14—Area of timberland with evidence of artificial regeneration in the South, by State and forest management type 123

3.15—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in the South, by ownership, selected years 1952–84, with projections to 2030 132

3.16—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in the South, by forest management type, selected years 1952–84, with projections to 2030 135

3.17—Annual mortality of softwood growing stock on timberland in the South, by region and ownership, 1952–84 151

3.18—Distribution of pine and mixed pine–hardwood stands in the South, by age group and broad ownership class, 1985 155

3.19—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in the South, by ownership, selected years 1952–84, with projections to 2030 166

Page

3.20—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in the South, by forest management type, selected years 1952–84, with projections to 2030 168

3.21—Annual mortality of hardwood growing stock on timberland in the South, by region and ownership, 1952–84 182

Chapter 5—Opportunities for Increasing Timber Supplies Through More Intensive Forestry

5.1—Area of timberland in the South needing treatment to improve productivity, by region, State and ownership 233

5.2—Area of timberland in the South needing treatment to improve productivity, by forest management type and treatment need 233

5.3—Range of 1985 timber stumpage prices in the South used for financial analyses of investment opportunities to increase net annual growth, by State 237

5.4—Ranges of direct costs for three treatment cost levels of management practices to increase net annual timber growth in the South 238

5.5—Mean annual increment of growing stock trees for well-stocked stands in the South, by forest management type and site class for selected stand ages 238

5.6—Timberland needing treatment to improve productivity in the South, the area of timberland with opportunities for increasing net annual growth which will yield 4 percent or more, and the associated treatment cost and net annual growth increment, by region and State 240

5.7—Timberland needing treatment to improve productivity in the South, the area of timberland with opportunities for increasing net annual growth which will yield 10 percent or more, and the associated treatment cost and net annual growth increment, by region and State 245

5.8—Area of marginal cropland and pasture in the South, including highly erodible cropland, the cost of establishing pine plantations on this land, and the resulting net annual timber growth if this land were planted to pine or allowed to revert naturally to forest, by State and region 251

5.9—Area of highly erodible cropland in the South, the cost of establishing pine plantations on this land and the resulting net annual timber growth, by State and region 253

List of Tables Within Appendices

Appendix 1—Tables Supporting Chapter 1: The Economic Importance of Forests in the South

Page

1.1—Total land area, cropland, and pasture (1982) and timberland (1985) in the South, by region and State 257

1.2—Estimated volume of roundwood timber products in the South, by product, softwoods and hardwoods, region, and State, 1984 258

1.3—Estimated stumpage value of roundwood timber products in the South, by product, softwoods and hardwoods, region, and State, 1984 259

1.4—Estimated value at local points of delivery of roundwood timber products in the South, by product, softwoods and hardwoods, region, and State, 1984 260

1.5—Estimated value at local points of delivery of roundwood timber products and other agricultural crops in the South, by region and State, 1984 261

1.6—Estimated values at local points of delivery of roundwood timber products and the highest valued agricultural crops for regions and States in the South, 1984 262

1.7—Type II output, income, and employment multipliers for States in the South, by type of forest industry, 1984 263

1.8—Number of establishments, employment, wages and salaries, value of shipments, and value added for all manufacturing and for forest industries in the South, by region and State, 1982 264

1.9—Number of establishments, employment, wages and salaries, value of shipments, and value added by manufacture in the forest industries in the South, by region, State, and type of industry, 1982 265

1.10—Employment in manufacturing of lumber and wood products and pulp and paper products in the South, by region and State, selected years 1947–82 268

1.11—Wages and salaries in manufacturing of lumber and wood products and pulp and paper products in the South, by region and State, selected years 1947–82 270

1.12—Value added in manufacturing of lumber and wood products and pulp and paper products in the South, by region and State, selected years 1947–82 273

1.13—Employment, wages and salaries, and value added by manufacture in forest industries in the South, by industry group, region and State, 1982 and 1985 276

Appendix 2—Tables Supporting Chapter 2: The Changing Forest Resources and Forest Industries in the South

2.1—Rosin production in the United States, by source, selected years 1900–84 279

2.2—Turpentine production in the United States, by type, selected years 1900–84 279

2.3—Reported lumber production in the South, by major species or species group, selected years 1869–1984 280

2.4—Reported lumber production in the South, by region, State, and species group, selected years 1955–84 281

2.5—Reported yellow pine lumber production in the South, by region and State, selected years 1869–1954 282

2.6—Reported cypress lumber production in the South, by region and State, selected years 1869–1954 283

Page

2.7—Reported oak–hickory lumber production in the South, by region and State, selected years 1869–1954 284

2.8—Reported gum and tupelo lumber production in the South, by region and State, selected years 1879–1954 285

2.9—Reported ash, cottonwood and elm lumber production in the South, by region and State, selected years 1899–1954 286

2.10—Federal and State expenditures for protection from wildfire, total acres protected, total acres burned, and acres of timberland burned on non-Federal protected lands in the South, by region, selected years 1916–83 287

2.11—Regeneration in the South by ownership and region, 1925–85 289

2.12—Regeneration in the Southeast region by ownership and State, 1925–85 291

2.13—Regeneration in the South Central region by ownership and State, 1925–85 297

2.14—Federal expenditures for regeneration and stand improvement and acres treated on other private ownerships in the South, by region, 1936–85 305

2.15—Activities of State forestry agencies in the South, by region and State, fiscal year 1985 311

2.16—Federal funds allocated to the Southern Forest Experiment Station for forest research, by functional activity, 1922–86 313

2.17—Federal funds allocated to the Southeastern Forest Experiment Station for forest research, by functional activity, 1932–86 315

2.18—Federal and State expenditures for forest management assistance in the South, by region, 1951–85 317

2.19—Stand improvement in the South, by ownership and region, 1974–85 318

2.20—Stand improvement in the Southeast region, by ownership and State, 1974–85 319

2.21—Stand improvement in the South Central region, by ownership and State, 1974–85 321

2.22—Forest Service and State expenditures for forest insect and disease management in the South, by region, 1965–84 323

2.23—Major timber-related provisions of current Federal income tax law 324

2.24—National forest expenditures for regeneration and stand improvement and acres treated on national forests in the South, by region, 1934–85 325

2.25—Volume and value of timber cut from National Forest System lands in the South, 1923–43 327

2.26—Volume and value of timber cut from National Forest System lands in the South, by region, 1944–85 328

2.27—Estimated woodpulp production in the South, by type of pulp, selected years 1899–1984 329

2.28—Softwood plywood production in the South, by region and State, 1964–84 330

2.29—Average pine stumpage prices for sawtimber and pulpwood in the South, by source of price data, selected years 1880–1985 331

2.30—Average hardwood stumpage prices for sawtimber and pulpwood in the South, by source of price data, selected years 1905–85 332

Page

2.31—Average pine stumpage prices for sawtimber sold from national forests in the South, by State for selected years 1950–85 333

2.32—Average hardwood stumpage prices for sawtimber sold from national forests in the South, by State for selected years 1950–85 334

2.33—Average pine stumpage prices for sawtimber, veneer timber, and pulpwood in the South, by region and product, 1977–85. (Southern Timber Price Regions Map) 336

2.34—Average mixed hardwood stumpage prices for sawtimber, veneer timber, and pulpwood in the South, by region and product, 1977–85 338

2.35—Average select hardwood stumpage prices for sawtimber and veneer timber in the South, by region and product, 1977–85 339

2.36—Average pine stumpage prices for pulpwood sold from national forests in the South, by State for selected years, 1950–85 340

2.37—Average hardwood stumpage prices for pulpwood sold from national forests in the South, by State for selected years 1957–85 341

Appendix 3—Tables Supporting Chapter 3: Projected Changes in the Timber Resource.

3.1—Area of timberland, by ownership and forest management type in the Southeast region, selected years 1952–85, with projections to 2030 343

3.2—Area of timberland, by ownership and forest management type in the South Central region, selected years 1952–85, with projections to 2030 345

3.3—Area of timberland, by ownership and forest management type in Alabama, selected years 1952–85, with projections to 2030 347

3.4—Area of timberland, by ownership and forest management type in Arkansas, selected years 1952–85, with projections to 2030 349

3.5—Area of timberland, by ownership and forest management type in Florida, selected years 1952–85, with projections to 2030 351

3.6—Area of timberland, by ownership and forest management type in Georgia, selected years 1952–85, with projections to 2030 353

3.7—Area of timberland, by ownership and forest management type in Louisiana, selected years 1952–85, with projections to 2030 355

3.8—Area of timberland, by ownership and forest management type in Mississippi, selected years 1952–85, with projections to 2030 357

3.9—Area of timberland, by ownership and forest management type in North Carolina, selected years 1952–85, with projections to 2030 359

3.10—Area of timberland, by ownership and forest management type in Oklahoma, selected years 1952–85, with projections to 2030 361

Page

3.11—Area of timberland, by ownership and forest management type in South Carolina, selected years 1952–85, with projections to 2030 363

3.12—Area of timberland, by ownership and forest management type in Tennessee, selected years 1952–85, with projections to 2030 365

3.13—Area of timberland, by ownership and forest management type in Texas, selected years 1952–85, with projections to 2030 367

3.14—Area of timberland, by ownership and forest management type in Virginia, selected years 1952–85, with projections to 2030 369

3.15—Empirical yields of growing stock assumed for pine plantations on forest industry, other corporate, and public ownerships 371

3.16—Empirical yields of growing stock assumed for pine plantations on private, nonindustrial ownerships 371

3.17—Empirical yields of growing stock assumed for natural pine stands on all ownerships 372

3.18—Empirical yields of growing stock assumed for mixed pine–hardwood stands on all ownerships 372

3.19—Empirical yields of growing stock assumed for upland hardwood stands on all ownerships 373

3.20—Empirical yields of growing stock assumed for bottomland hardwood stands on all ownerships 373

3.21—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in the Southeast region, by ownership, selected years 1952–84, with projections to 2030 374

3.22—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in the South Central region, by ownership, selected years 1952–84, with projections to 2030 375

3.23—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Alabama, by ownership, selected years 1952–84, with projections to 2030 376

3.24—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Arkansas, by ownership, selected years 1952–84, with projections to 2030 377

3.25—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Florida, by ownership, selected years 1952–84, with projections to 2030 378

3.26—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Georgia, by ownership, selected years 1952–84, with projections to 2030 379

3.27—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Louisiana, by ownership, selected years 1952–84, with projections to 2030 . . . . .

3.28—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Mississippi, by ownership, selected years 1952–84, with projections to 2030 381

3.29—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in North Carolina, by ownership, selected years 1952–84, with projections to 2030 382

3.30—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Oklahoma, by ownership, selected years 1952–84, with projections to 2030 383

Page

3.31—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in South Carolina, by ownership, selected years 1952–84, with projections to 2030 384

3.32—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Tennessee, by ownership, selected years 1952–84, with projections to 2030 385

3.33—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Texas, by ownership, selected years 1952–84, with projections to 2030 386

3.34—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Virginia, by ownership, selected years 1952–84, with projections to 2030 387

3.35—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in the Southeast region, by forest management type, selected years 1952–84, with projections to 2030 388

3.36—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in the South Central region, by forest management type, selected years 1952–84, with projections to 2030 389

3.37—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Alabama, by forest management type, selected years 1952–84, with projections to 2030 390

3.38—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Arkansas, by forest management type, selected years 1952–84, with projections to 2030 391

3.39—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Florida, by forest management type, selected years 1952–84, with projections to 2030 392

3.40—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Georgia, by forest management type, selected years 1952–84, with projections to 2030 393

3.41—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Louisiana, by forest management type, selected years 1952–84, with projections to 2030 394

3.42—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Mississippi, by forest management type, selected years 1952–84, with projections to 2030 395

3.43—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in North Carolina, by forest management type, selected years 1952–84, with projections to 2030 396

3.44—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Oklahoma, by forest management type, selected years 1952–84, with projections to 2030 397

3.45—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in South Carolina, by forest management type, selected years 1952–84, with projections to 2030 398

3.46—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Tennessee, by forest management type, selected years 1952–84, with projections to 2030 399

3.47—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Texas, by forest management type, selected years 1952–84, with projections to 2030 400

3.48—Softwood roundwood supplies, timber removals, net annual growth, and inventory of softwood growing stock in Virginia, by forest management type, selected years 1952–84, with projections to 2030 401

Page

3.49—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in the Southeast region, by ownership, selected years 1952–84, with projections to 2030 402

3.50—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in the South Central region, by ownership, selected years 1952–84, with projections to 2030 403

3.51—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Alabama, by ownership, selected years 1952–84, with projections to 2030 404

3.52—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Arkansas, by ownership, selected years 1952–84, with projections to 2030 405

3.53—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Florida, by ownership, selected years 1952–84, with projections to 2030 406

3.54—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Georgia, by ownership, selected years 1952–84, with projections to 2030 407

3.55—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Louisiana, by ownership, selected years 1952–84, with projections to 2030 408

3.56—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Mississippi, by ownership, selected years 1952–84, with projections to 2030 409

3.57—Hardwood roundwood supplies, timber removals, net annual growth an inventory of hardwood growing stock in North Carolina, by ownership, selected years 1952–84, with projections to 2030 410

3.58—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Oklahoma, by ownership, selected years 1952–84, with projections to 2030 411

3.59—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in South Carolina, by ownership, selected years 1952–84, with projections to 2030 412

3.60—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Tennessee, by ownership, selected years 1952–84, with projections to 2030 413

3.61—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Texas, by ownership, selected years 1952–84, with projections to 2030 414

3.62—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Virginia, by ownership, selected years 1952–84, with projections to 2030 415

3.63—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in the Southeast region, by forest management type, selected years 1952–84, with projections to 2030 416

3.64—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in the South Central region, by forest management type, selected years 1952–84, with projections to 2030 417

3.65—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Alabama, by forest management type, selected years 1952–84, with projections to 2030 418

3.66—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Arkansas, by forest management type, selected years 1952–84, with projections to 2030 419

Page

3.67—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Florida, by forest management type, selected years 1952–84, with projections to 2030 420

3.68—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Georgia, by forest management type, selected years 1952–84, with projections to 2030 421

3.69—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Louisiana, by forest management type, selected years 1952–84, with projections to 2030 422

3.70—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Mississippi, by forest management type, selected years 1952–84, with projections to 2030 423

3.71—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in North Carolina, by forest management type, selected years 1952–84, with projections to 2030 424

3.72—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Oklahoma, by forest management type, selected years 1952–84, with projections to 2030 425

3.73—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in South Carolina, by forest management type, selected years 1952–84, with projections to 2030 426

3.74—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Tennessee, by forest management type, selected years 1952–84, with projections to 2030 427

3.75—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Texas, by forest management type, selected years 1952–84, with projections to 2030 428

3.76—Hardwood roundwood supplies, timber removals, net annual growth, and inventory of hardwood growing stock in Virginia, by forest management type, selected years 1952–84, with projections to 2030 429

Appendix 4—Tables Supporting Chapter 4: Implications of the Base Projections of Changes in the Timber Resource and of Other Selected Futures

4.1—Simulated effects of selected futures on projected softwood roundwood supplies on all ownerships, net annual growth and inventories of growing stock by private ownership and region; and softwood stumpage price indexes, lumber production, plywood production, pulpwood consumption, by region, in the South, selected years 1984–2030 431

4.2—Simulated effects of selected futures on projected softwood roundwood supplies, net annual growth and inventories of growing stock by private ownership by section or region; softwood stumpage price indexes, softwood lumber and plywood production and roundwood pulpwood consumption by section or region; and softwood lumber price indexes and imports in the United States, selected years 1984–2030 439

4.3—Simulated effects of selected futures on projected hardwood roundwood supplies on all ownerships, net annual growth and inventories of growing stock by private ownership and region; and hardwood stumpage price indexes, lumber production, pulpwood consumption, by region, in the South, selected years 1984–2030 447

4.4—Simulated effects of selected futures on projected hardwood roundwood supplies, net annual growth and inventories of growing stock by private ownership by section or region; hardwood stumpage price indexes, hardwood lumber production and roundwood pulpwood consumption by section or region; and hardwood lumber price indexes in the United States, selected years 1984–2030 454

Page

4.5—Simulated effects of selected futures on projected employment and wages and salaries in forest industries, investments in plants and equipment, and total State and local government revenues, in the South, selected years 1984–2030 461

4.6—Simulated effects of selected futures on forage, wildlife, fish, and water, by region in the South, selected years 1985–2030 464

Appendix 5—Tables Supporting Chapter 5: Opportunities for Increasing Timber Supplies Through More Intensive Forestry

5.1—Opportunities for increasing timber supplies on timberland in the South which will yield 4 percent or more, by ownership, forest management type, and treatment opportunity 469

5.2—Opportunities for increasing timber supplies on timberland in the Southeast that will yield 4 percent or more, by ownership, forest management type, and treatment opportunity 473

5.3—Opportunities for increasing timber supplies on timberland in the South Central region that will yield 4 percent or more, by ownership, forest management type, and treatment opportunity 477

5.4—Opportunities for increasing timber supplies on timberland in the South that will yield 10 percent or more, by ownership, forest management type, and treatment opportunity 481

5.5—Opportunities for increasing timber supplies on timberland in the Southeast that will yield 10 percent or more, by ownership, forest management type, and treatment opportunity 485

5.6—Opportunities for increasing timber supplies on timberland in the South Central region that will yield 10 percent or more, by ownership, forest management type, and treatment opportunity 489

[This page intentionally left blank.]

Glossary of Terms

Bottomland hardwoods—Bottomland forests in which 50 percent or more of the stand is tupelo, blackgum, sweetgum, oak, and southern cypress, singly or in combination, and southern pine makes up less than 25 percent. Common associates include cottonwood, willow, oak, elm, hackberry, and maple. This type is found on the alluvial flood plains of the Mississippi and other southern rivers.

Coastal Plain—The geographic area that stretches inland along the coast from Virginia to Texas. It includes all of Florida, Mississippi, and Louisiana; over half of South Carolina, Georgia, and Alabama; southeastern Virginia, North Carolina, Texas, and Arkansas; western Tennessee and the southeastern corner of Oklahoma. It has gentle slopes with little local relief. Marshes, swamps, and lakes are common.

Cord—A stack of wood containing 128 cubic feet within its outside surface. The standard dimensions are 4 by 4 by 8 feet.

Corporate lands—Lands owned by corporate organizations other than forest industry, such as utility companies, railroads, realty firms, hunting clubs, insurance companies, and banks.

Cropland—Land used for the production of adapted crops for harvest, including row crops, small grain crops, hay crops, nursery crops, orchard crops, and other specialty crops. The land may be used continuously for these crops, or they may be grown in rotation with grasses and legumes.

Cull trees—Live trees of sawtimber and poletimber size that are unmerchantable for sawlogs now or prospectively because of roughness, rot, or species.

Diameter classes—A classification of trees based on diameter outside bark measured at breast height (4 1/2 feet above ground). D.b.h is the common abbreviation for "diameter at breast height." When using 2-inch diameter classes, the 6-inch class, for example, includes trees 5.0 through 6.9 inches d.b.h. inclusive.

Douglas-fir region—The geographic area west of the crest of the Cascade Range in Oregon and Washington.

Economic opportunities to increase net annual growth on:

Timberland—All opportunities on timberland to increase net annual timber growth or value that would yield 4 percent or more (in constant dollars net of inflation or deflation) on the investments required to implement the opportunities.

Cropland and pasture—All opportunities on cropland and pasture that would yield higher rates of return to the owner if planted to pine.

Farmer-owned lands—Lands owned by a person who operates a farm, either doing the work himself or directly supervising the work.

"First forest"—The forest that existed in the South before the first clearing or harvest.

Forest industries—Includes all or part of four industry groups classified under the Standard Industrial Classification System—lumber and wood products, furniture and fixtures, paper and allied products, and gum and wood chemicals—used by the Bureau of the Census in the preparation of Censuses of Manufactures.

Forest industry lands—Lands owned or under lease for one rotation or longer by companies or individuals operating wood-using plants.

Forest land—Land at least 10 percent stocked by forest trees of any size, including land that formerly had such tree cover and that will be naturally or artificially regenerated to trees. Forest land includes transition zones, such as areas between heavily forested and nonforested lands that are at least 10 percent stocked with forest trees, and forest areas adjacent to urban and built-up lands. Also included are pinyon–juniper and chaparral areas in the West, and afforested areas. The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 feet to qualify as forest land. Unimproved roads and trails, streams, and clearings in forest areas are classified as forest if less than 120 feet in width.

Forest management type—A classification of timberland based upon the species and source of trees forming a plurality of live trees present.

Forest Survey—A survey conducted by the U.S. Department of Agriculture, Forest Service that provides a continuing inventory of the area, location and condition of forest lands, amounts and quality of timber volumes available, rates of timber growth, timber removals and mortality, ownership of forest land timber, and trends in timber consumption.

"Fourth forest"—The forest that will exist in the decades beyond 2000, after the harvest or clearing of the third forest—the one that now exists in the South.

Fuelwood—The wood—roundwood and byproducts—used for cooking, heating, and power generation.

Growing stock—Live sawtimber trees, poletimber trees, saplings, and seedlings on timberland meeting specified standards of quality or vigor; excludes cull trees.

Growing stock volume—Net volume in cubic feet of live sawtimber and poletimber trees on timberland from stump to a minimum 4-inch top (central stem) outside bark or to the point where the central stem breaks into limbs.

Hardwoods—Dicotyledonous trees, usually broad-leaved and deciduous.

Highly erodible cropland—All cropland in Land Capability Classes (classifications used by the Soil Conservation Service to rate the suitability of soils for agricultural production) 3e, 4e, 6e, and 7e.

Industrial roundwood—All commercial roundwood products except fuelwood.

Industrial timber (wood) products—Sawlogs; veneer logs; pulpwood; cooperage logs and bolts; piling and poles; mine timbers; posts; bolts used for shingles, handles, and wood turnings; and panel products and chemical wood.

Inventory—Net volume in cubic feet of growing stock trees 5.0 inches in d.b.h and over from a 1-foot stump to a mininum 4.0-inch top diameter outside bark of the central stem or to the point where the central stem breaks into limbs.

Local points of delivery—First location to which roundwood timber or other timber products are transported after harvest, such as concentration yards or rail sidings.

Marginal cropland and pasture—Cropland and pasture that would yield higher rates of return to the owner if planted to pine.

Mixed pine–hardwood—Forests in which 50 percent or more of the stand is hardwood, usually upland oaks, and southern pines make up 25–49 percent. Common associates include upland oak–shortleaf pine in the foothills and plateaus; mixed hardwood–loblolly pine on moist sites; and scrub oak–longleaf pine in the sand hills of the Carolinas, Georgia, and Florida.

Mortality—The volume of sound wood in trees that have died from natural causes during a specified period.

National forest land—Federal land designated by Executive Order or statute as national forests or purchase units, and other lands under the administration of the Forest Service, including experimental areas and Bankhead–Jones Title III lands.

Natural pine—Forests in which 50 percent or more of the naturally established stand is loblolly pine, slash pine, shortleaf pine, longleaf pine, or other southern pines singly or in combination. Common associates include oak, hickory, and gum.

Net annual timber growth—The net increase in the volume of trees during a specified year. Components of net annual growth include the increment in net volume of trees at the beginning of the specific year surviving to its end, plus the net volume of trees reaching the minimum size class during the year, minus the volume of trees that died during the year, and minus the net volume of trees that became rough or rotten trees during the year.

Nonstocked areas—Timberland less than 10 percent stocked with growing-stock trees.

North—A geographic area that includes 25 Northern States divided into two regions.

The Northeast region—includes 12 States—Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, Delaware, Maryland, New Jersey, New York, Pennsylvania, and West Virginia.

The North Central region—includes 13 States—Michigan, Minnesota, North Dakota, South Dakota (eastern), Wisconsin, Illinois, Indiana, Iowa, Kansas, Kentucky, Missouri, Nebraska, and Ohio.

Other individual lands—Lands owned by private individuals except farmers.

Other private lands—Lands owned by private individuals and corporations except those in the forest industry.

Other public lands—Land owned by the public—State, county, municipal, and Federal except national forest.

Other removals—The net volume of growing-stock trees removed from the inventory by cultural operations such as timber-stand improvement, by land clearing, and by changes in land use, such as a shift to wilderness.

Pacific Northwest—A geographic area that includes Oregon and Washington.

Pacific Southwest—A geographic area that includes California.

Pasture—Land used for production of introduced or native forage plants for grazing.

Piedmont—The geographic area between the Coastal Plain and the Appalachian Mountains in Alabama, Georgia, the Carolinas, and Virginia. It is gently sloping with elevations between 100 and 600 feet.

Pine plantations—Forests in which 50 percent or more of the stand is loblolly pine, slash pine, shortleaf pine, longleaf pine or other southern pines, which have been established by planting or direct seeding.

Plant byproducts—Wood material (such as slabs, edgings, trimmings, miscuts, sawdust shavings, veneer cores and clippings, and pulp screenings) from primary manufacturing plants used for pulp and other products.

Pulpwood—The wood—roundwood and plant byproducts—used in the manufacture of woodpulp.

Rocky Mountain—The geographic area that includes nine States—Arizona, Idaho, Montana, South Dakota (western), Wyoming, Colorado, Nevada, New Mexico, and Utah.

Rotten trees—Live trees of commercial species that do not contain a sawlog now or prospectively, primarily because of rot (e.g., when rot accounts for more than 50 percent of the total cull volume).

Roundwood—Logs, bolts, or other round sections cut from growing stock and nongrowing stock sources such as trees smaller than 5 inches d.b.h; stumps, tops, and limbs of growing stock trees; rough and rotten trees; dead trees; and trees that grow on land other than timberland.

Roundwood supplies—The volume of roundwood harvested or available for harvest in the future. Includes roundwood from growing stock and nongrowing stock sources.

Roundwood equivalent—The volume of logs or other round products required to produce given quantities of lumber, plywood, woodpulp, paper, or other similar products.

Rough trees—(a) Live trees of commercial species that do not contain a sawlog, now or prospectively, primarily because of roughness, poor form, splits, and cracks, and with less than one-third of the gross tree volume in sound material; and (b) all live trees of noncommercial species.

Sawlog—A log used in the manufacture of lumber.

Sawtimber—Stands at least 10 percent occupied with growing-stock trees, with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

"Second forest"—The forest that became established in the South following the harvest of the region's original forests of virgin timber. The second forest was the source of the bulk of the wood used by the forest industries from the 1930's through the 1960's.

Site productivity—A measure of the inherent capability of land to grow timber based on fully stocked natural stands.

High sites—Land capable of growing 85 cubic feet of wood per acre per year in fully stocked natural stands.

Medium sites—Land capable of growing 50 to 85 cubic feet of wood per acre per year in fully stocked natural stands.

Low sites—Land capable of growing 20 to 49 cubic feet of wood per acre per year in fully stocked natural stands.

Softwoods—Coniferous trees, usually evergreen, having needles or scalelike leaves.

South—A geographic area that includes 12 Southern States divided into two regions.

Southeast region—The geographic area that includes five States along the Southeast Atlantic coast—Virginia, North Carolina, South Carolina, Georgia, and Florida.

South Central region—The geographic area that includes seven States along the gulf coast and inland—Alabama, Mississippi, Louisiana, Arkansas, Tennessee, Oklahoma, and Texas.

Stand-size class—A classification of forest land based on the predominant size of timber present.

Stocking—The degree of occupancy of land by trees, measured by basal area and/or number of trees by size and spacing, compared to a stocking standard, i.e., the basal area and/or number of trees required to fully utilize the growth potential of the land.

Stumpage—Standing timber (trees) in the forest.

Stumpage price—The price paid for standing timber (trees) in the forest.

"Third forest"—The forest that became established in the South in the period from the 1930's through the 1960's. This forest is or will be the source of the bulk of the wood used by the forest industries from the 1970's through 2000.

Timberland—Forest land which is producing or is capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation. (Note: Areas qualifying as timberland have the capability of producing in excess of 20 cubic feet per acre per year of industrial wood in natural stands. Areas currently inaccessible and inoperable are included.)

Timber removals—The net volume of growing stock trees removed from the inventory by harvesting; cultural operations, such as timber stand improvement; land clearing; or changes in land use.

Timber supplies—The volume of roundwood harvested or available for harvest in the future. Includes roundwood from growing stock and nongrowing stock sources.

Urban and other areas—Areas within the legal boundaries of cities and towns; suburban areas developed for residential, industrial, or recreational purposes; school yards; cemeteries; roads, railroads; airports; beaches, power lines, and other rights-of-way; or other nonforest land not included in any other specified land use class.

Veneer logs—The logs used in the manufacture of veneer.


SAndra Phelps '86